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Chelyabinskites – new type of natural formations from area of falling of the Chelyabinsk meteorite.

It is devoted 197-anniversary ***Russian Mineralogical Society.***
On January, 19th, 2014.

The short information note brought to your attention sets as the purpose to inform readers, both fans, and professionals, about preliminary results of studying ***Chelyabinskites*** *- the unusual natural formations connected with falling of the Chelyabinsk meteorite on February, 15th, 2013. The Term is offered by us for the breeds presented by three varieties (Microspherulas ferruterous and silikate-ferruterous composition; essentially ferruterous ash facies with fragments of various breeds; melt facies a similar composition). The history of researches, a technique of the works, the first results and, in more details, the data microprobe researches are more low stated. Our materials are accompanied by photos and tables in which are given both primary analyses, and the results of interpretation which are based on methods of the multidimensional statistical analysis. In the end of an information note some genetic conclusions are drawn and problems of the further researches are discussed.*

History of researches and technique of works.

On February, 15th, 2013 in Southern Ural Mountains meteorite falling (http://ru.wikipedia.org/w/index.php?title=%D0%9F%D0%B0%D0%B4%D0%B5%D0%BD%D0%B8%D0%B5_%D0%BC%D0%B5%D1%82%D0%B5%D0%BE%D1%80%D0%B8%D1%82%D0%B0_%D0%A7%D0%B5%D0%BB%D1%8F%D0%B1%D0%B8%D0%BD%D1%81%D0%BA&stable=1) was observed http://ru.wikipedia.org/w/index.php?title=%D0%9F%D0%B0%D0%B4%D0%B5%D0%BD%D0%B8%D0%B5_%D0%BC%D0%B5%D1%82%D0%B5%D0%BE%D1%80%D0%B8%D1%82%D0%B0_%D0%A7%D0%B5%D0%BB%D1%8F%D0%B1%D0%B8%D0%BD%D1%81%D0%BA&stable=1. *Among numerous publications about Chelyabinsk a meteorite (**ChM**) we will note special releases of magazines "Geochemistry" (http://www.maikonline.com/maik/showIssueContent.do?puid=VIH9I8OUH0&lang=ru) and «The Astronomical bulletin, № 47 (4), 2013» (http://www.maikonline.com/maik/showIssueContent.do?puid=VIH7REWFRJ&lang=ru), and also Olga Popova's article and the big collective of authors (https://www.sciencemag.org/content/early/2013/11/06/science.1242642.full) in volume 156 p. We will notice that some questions connected with falling of the Chelyabinsk meteorite, have not involved proper attention of scientists. First of all it concerns assumptions of possible participation of **UFO** in destiny **ChM** and questions of studying of micro-meteoric formations. These directions of researches have something in common with G.T.Skublov's earlier works on Tunguska "meteorite" (http://www.hodka.net/sb2012.pdf - p. 172-209) and with results of studying by it of various natural phenomena (http://www.hodka.net/labazskub.php). Elena Mihajlovna Potapovich (http://uyrgii.ru/index.php/khoreograficheskij-fakultet/otdeleniya-vkhodyashchie-v-sostav-khoreograficheskogo-fakulteta.html?id=695) has become interested in this points in question as the witness of the Chelyabinsk tragedy on **February, 15th, 2013** and as the person repeatedly observing UFO-ACTIVITY in Chelyabinsk. It also has led to active creative commonwealth and search of true by two people (**GTS = Gennady Tihonovich Skublov**; **EMP = Elena Mihajlovna Potapovich**), got acquainted on the Internet only on February, 21st, 2013*

The historical inquiry. *With a known share of convention it is possible to allocate 4 stages in studying chelyabinskites: 1 – February-March 2013 г; 2 – April-May; 3 – June-*

*September; 4 – October-December, 2013 we will consider these stages more detailed and taking into account the basic events on studying **ChM**.*

The first stage (February-March 2013). *In the first days after falling **ChM** on the Internet there was a considerable quantity of interesting photos (**Foto-1** in our photo-album see) and video-rollers at which storyboard the attention to hyperactivity of **UFO** was paid at falling **ChM** (**Foto-2**). **GTS** one of the first has underlined that obvious fact that **ChM** has left a powerful trace of ionised air and that bright white the trace (**Foto-1**) is left by **UFO-TERMINATOR**, on V.Uvarov's terminology (http://wands-of-horus.com/ru/iicufi/meteors/86-cheliabinsk-metheorite.html). As an essential argument for similar interpretation of events has served video-roller (http://www.youtube.com/watch?v=EPs3YOnAkws) where not without the bases affirmed that «us have rescued».*

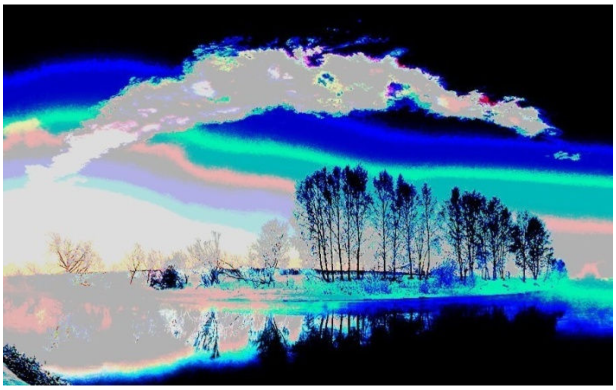
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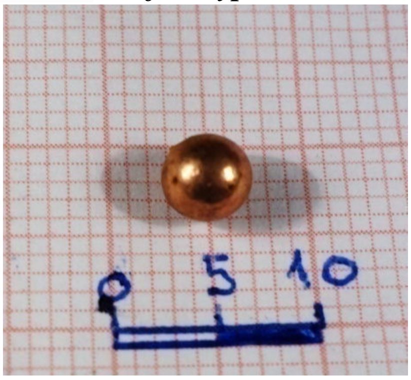
Фото – 01. *Photo M.Akhmetvaleev (http://marateaman.livejournal.com/27910.html), treated G/Skublov with program Photoshop and published February 22, 2013 on Facebook (https://www.facebook.com/photo.php?fbid=444891878913083&set=a.444884775580460.96626.100001768237075&type=3&theate) . Can clearly see the intersection of two ranges: early meteor trail with a large ionization zoning; later a white trail belongs to the UFO. Фотография М. Ахметвалеева (http://marateaman.livejournal.com/27910.html), обработанная Г.Скубловым с помощью программы Фотошоп и опубликованная 22 февраля 2013 г на Фейсбуке (https://www.facebook.com/photo.php?fbid=444891878913083&set=a.444884775580460.96626.100001768237075&type=3&theater). Отчетливо видно пересечение двух ареалов: первый - с крупной ионизационной зональностью; второй - псевдооблачный след.*

Фото – 02. *UFO photo-plasmoid but against the misty footprint in the area of falling of the Chelyabinsk meteorite. The result of a storyboard video-plot (http://www.youtube.com/watch?v=S717Jo-dPVk) and published G.Skublov 22 February on Facebook (https://www.facebook.com/skublov/media_set?set=a.446435655425372.97014.100001768237075&type=3).Фотография НЛО-плазмоида но фоне псевдооблачного следа в районе падения Челябинского метеорита. Получена в результате раскадровки видео-сюжета (http://www.youtube.com/watch?v=S717Jo-dPVk) и опубликована Г.Скубловым 22 февраля на Фейсбуке (https://www.facebook.com/skublov/media_set?set=a.446435655425372.97014.100001768237075&type=3*

EMP**, which house (co-ordinates 55,119586^o N and 61,336882^o) is in Chelyabinsk almost in epicentre of the seismo-tectonic motions accompanying explosion of the Chelyabinsk meteorite, has paid attention to the strange metal taste which has appeared after explosion **ChM**, on not clear the soot cloud, on numerous UFO and on obvious not consistent among themselves of the statement resident about a trajectory of a race car and about placing of sites of super-luminosity in city boundaries. This data has formed the basis for carrying out within personal plot **EMP** of specialised geochemical approbation of uneven-age snow layers – before the disaster, during the disaster (in 5 points) , after the disaster. **EMP** 17 tests of snow have been selected and established that the quantity of a dust in disaster at 5-10 time exceeds level of its maintenances in a spreading and blocking snow cover. Moreover, the size of particles of a technogenic dust did not exceed 300 micron while the size of the greater part of disaster «motes» exceeded 400 microns. The most interesting fact has appeared detection only in the disaster layer small rare 300-700- micron сферул to which it is usually groundless the term – «a space ball» is pasted. We will notice that in snow on a roof of hothouse **EMP** has found out Spherulas with a diameter in 4500 micron (**Foto-3**). So in the end of February on a personal plot with the* *successful name* ***"JASMIN" *have been opened Microspherulas which are considered by us as* ***Chelyabinskites the first type****.*



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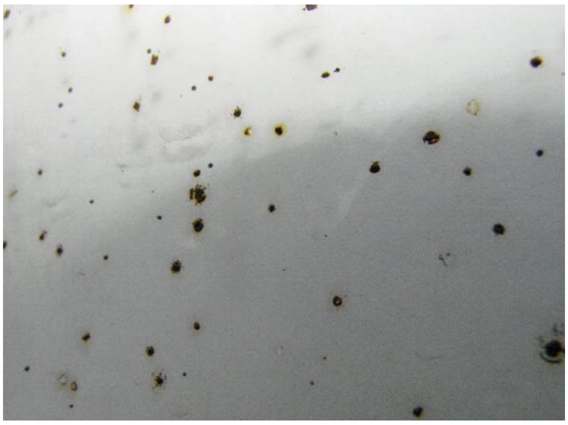

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Фото – 03. *The largest ball chelyabinskite found E.M.Potapovich on the roof of the greenhouse (section JASMINE) in the layer of snow from 15 February 2013 Photo G.Skublov.*
Самый крупный шарик челябинскита, обнаруженный Е.М.Потапович на крыше теплицы (участок ЖАСМИН) при фильтрации слоя снега от 15 февраля 2013 г. Фото Г.Скублова.
Фото – 04. *Alleged traces of education chelyabinskites on a window pane of the Chelyabinsk state University. According to the article «Meteorite melted glass in SUSU», published on 6 March 2013 (http://www.1obl.ru/news/o-lyudyakh/meteorit-rasplavil-steklo-v-yuurgu/).*
*Предполагаемые следы образования челябинскитов на оконном стекле Челябинского гос.университета. По материалам статьи «****Метеорит расплавил стекло в ЮУрГУ****», опубликованной 6 Марта 2013 г. (http://www.1obl.ru/news/o-lyudyakh/meteorit-rasplavil-steklo-v-yuurgu/).*
Фото – 05. *Glass greenhouse with «spots chelyabinskites» (photo EM Potapovich).*
Стекло теплицы с «пятнами челябинскитов» (фото Е.М. Потапович).
Фото – 06*. Glass greenhouse with «spots chelyabinskitesчелябинскитов» - closeup (photo EM Potapovich).*
Стекло теплицы с «пятнами челябинскитов» - крупным планом (фото Е.М. Потапович).

On March, 6th, 2013 in mass-media the small note (http://www.1obl.ru/news/o-lyudyakh/meteorit-rasplavil-steklo-v-yuurgu/) in which it was informed has imperceptibly flown http://www.1obl.ru/news/o-lyudyakh/meteorit-rasplavil-steklo-v-yuurgu/*that in Chelyabinsk on 4 floor South Ural state University on a windowpane there was an unusual print with metal parts (****Foto-4****). «At first all have thought that it is a usual slap of a dirt. But the next glass has been beaten out by a shock wave, and it is whole, but with fusion traces. Have tried magnet to spend on divorces, reaction was positive. At scientists a find a keen interest has not caused. According to experts from ChelGU, dark divorces are not metal, and a dirt or traces from insects ». Such interpretation in the spirit of playful «insect-Komar hypotheses of the Tunguska phenomenon»has seemed to us unpersuasive. Attempt* ***EMP*** *to receive windowpane ChelGU for the further researches has not crowned success. However this failure has been compensated by detection not less effective «komar-metal spots» on glasses of hothouse* ***EMP*** *(****Foto-5 and 6****). At assumption check (whether Greenhouse window spots traces from work as the Bulgarian are?) It is established that in these essentially ferruterous spots sometimes concentrate Zr and Sr that specified in obviously not meteoritic origin* ***Melt*** *spots and promoted reflexions about their* *possible communication with Carbonatites processes. So have been opened Chelyabinskites Melt facies which are considered by us as* ***Chelyabinskites the third type****.*

Let's sum up - by the end of March authors of an information note had a consensus about necessity of carrying out of geochemical approbation of the top soil horizon around falling ***ChM*** *for the purpose of searches Microspherulas, and also profound detailed studying Greenhouse melt spots.*

The second stage (April-May 2013) *can be considered as a pause in studying Chelyabinskites.* ***GTS*** *prepared for the report «About paradoxes of the Chelyabinsk meteorite» at Anniversary conference* ***Russian Mineralogical Society*** *to V.I.Vernadskiy's 150 anniversary. Report materials are published in May, 2013 on web-site* ***ХОДКА*** *in the form of 2 articles – «Hydrogen decontamination in the USA» (http://www.hodka.net/DOC222.PDF) and «The Trajectory of flight* ***ChM****» (http://www.hodka.net/DOC221.PDF).* ***EMP*** *at this time was engaged in information collection on ЧМ both on the Internet, and at local residents.*

The third stage (June-September, 2013). Sampling. *In the beginning of June, 2013* ***EMP*** *has selected for the further mineralogical-geochemical researches 2-kg-probe of friable adjournment from soil horizon of the personal plot in immediate proximity from mentioned above a hothouse (a site the* ***Jasmin*** *– co-ordinates 55,119586^o N and 61,336882^o). This site is located in 1,24 km to the West from Psychiatric hospital (55,118672^o N and 61,356742^o) which windowpanes have strongly suffered as a result of explosion in the morning on February, 15th, 2013. For the subsequent comparison of a site the* ***Jasmin*** *with other sites of the city of Chelyabinsk* ***EMP*** *have been selected 2 samples where the most powerful beam burn (distance between points was observed makes no more than 250 m). These are sites* ***Park*** *(city park of A.S.Pushkin; co-ordinates - 55,154401^o N and 61,404161^o) and* ***Historical*** *(the thrown historical building Elevator in city centre; co-ordinates – 55,154426^o N and 61,403932^o).*

In July, 2013 ***EMP*** *at the desire of* ***GTS*** *has selected on prodeleting of an axial line of the maximum finds of Chelyabinsk meteorites (http://www.meteorite-recon.com/en/Meteorite_Chelyabinsk_6.html) 3 2-kg-probe of modern friable adjournment. The first site -* ***Epicentre*** *(54.833675°N and 61,437883^o) - is in point where the brightest flash of the Chelyabinsk meteor was observed; here electric mains and oil pipeline branches are crossed a motorway. The second site -* ***Baturinsky*** *(54.781035^o N and 61,370248^o) - is located in frontage by one of local residents of settlement. The third site –* ***Deputy*** *(54,838352^o N and 61,124483^o), - is in a farmstead of the local resident from settlement Deputy. The master of the house has given «for a science» 12 small specimens* ***ChM*** *in weight from 0,5 to 10 г everyone; fragments* ***ChM*** *are collected by it personally. Thus, for the further mineralogical-geochemical researches* ***EMP*** *has selected* ***3 soil*** *tests in city boundaries of Chelyabinsk (sites the* ***Jasmin, Park, Historical****), 3 tests along a trajectory of falling* ***ChM*** *(sites* ***Epicentre, Baturinsky, Deputy****) and 12 small specimens* ***ChM*** *from the inhabitant of settlement Deputy.*

Chebarcul conference. *On June, 21-22st, 2013 the International conference "****Asteroids*** *and comets* ***has been spent****.* ***The Chelyabinsk event and studying of falling of a meteorite in*** *lake* ***Chebarcul****" – (http://meteorites.ru/images/yuzhnouralsky2013/chebarkul_21-22.06.2013_asteroidy_i_komety_cheljabinskoe_sobytie.pdf). In* ***L.M.Gindilis and G.N.Sheveleva's*** *message «Gathering of snow around flight of the Chelyabinsk meteorite for the purpose of studying dust components» (p. 63-70) is in details discussed their technique of selection of 3 tests of snow and the scheme of spatial placing of points Sampling (****Foto-7****) is resulted. In* ***V.A.Tselmovich's*** *article «Space balls on an example of the Chelyabinsk meteorite» (p. 140-147) is resulted the description of microspheres and the microparticles which have been found out in blankets of the Chelyabinsk meteorite (****Foto-8****). On an example of successfully picked up photos with magnetite Spherulas author does a conclusion that « source of space balls (SB) on a surface of the Chelyabinsk meteorite is mineral troilite, in the course of fusion and which oxidation at flight in atmosphere and arise SB». In later, September publication mentioned above authors (http://www.igg.uran.ru/?q=ru/node/726 - p. 196-199) and in interview are resulted microprobe photos of space balls (http://cheremuha.com/obrazovanie-i-*

*[nauka/2482-zagadki-chelyabinskogo-meteorita-otkryivayut-pod-ryibinskom.html](http://cheremuha.com/obrazovanie-i-nauka/2482-zagadki-chelyabinskogo-meteorita-otkryivayut-pod-ryibinskom.html) - **Foto-9** see), found out in a snow cover in April, 2013 the attention to the small size SB (to 20 мк), wide development hollow Spherulas and on magnetite composition of these formations. Authors come to a conclusion that «hollow balls in samples of the Chelyabinsk dust have a meteoritic origin».*

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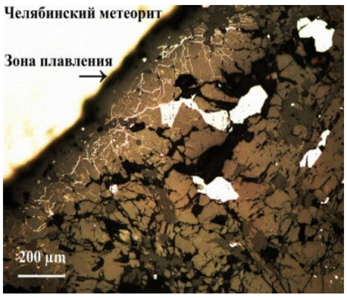

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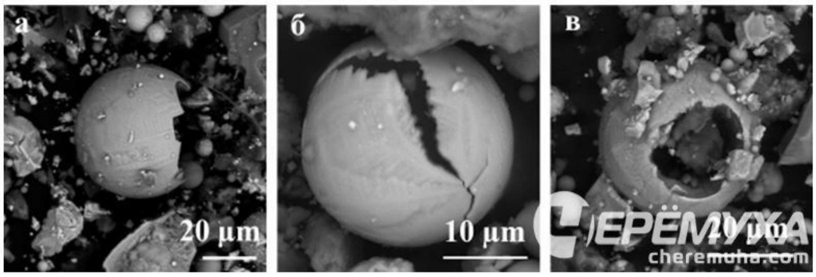

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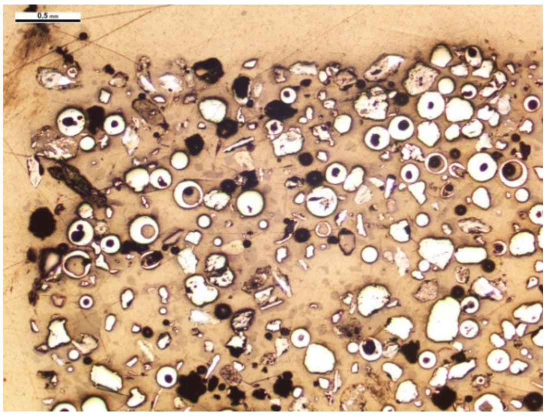
***Фото – 07**. The sampling scheme «meteoric» snow in area of falling of Chelyabinsk meteorite. Compiled L. Gindilis and G.Schevelev; published in the Materials of Chebarcul conference 21-22 June 2013, on page 65 (http://www.meteorites.ru/images/yuzhnouralsky2013/chebarkul_21-22.06.2013_asteroidy_i_komety_cheljabinskoe_sobytie.pdf).*
Схема отбора проб «метеоритного» снега в районе падения Челябинского метеорита. Составлена Л.М.Гиндилисом и Г.Н.Шевелевым; опубликована в Материалах Чебаркульской конференции 21-22 июня 2013 г., на стр. 65 (http://www.meteorites.ru/images/yuzhnouralsky2013/chebarkul_21-22.06.2013_asteroidy_i_komety_cheljabinskoe_sobytie.pdf).
***Фото – 08.** Photo of the polished surface of the sample Chelyabinsk meteorite with molten crust and microspherulas. Published V.Celmovich in the Materials of Chebarcul conference 21-22 June 2013, on page 143 (http://www.meteorites.ru/images/yuzhnouralsky2013/chebarkul_21-22.06.2013_asteroidy_i_komety_cheljabinskoe_sobytie.pdf). The article contains pictures of rare «magnetite space balls».*
Микрофото аншлифа Челябинского метеорита с корой плавления (по В.А.Цельмовичу) и микросферулами. Опубликовано в Материалах Чебаркульской конференции 21-22 июня 2013 г., на стр. 143 (http://www.meteorites.ru/images/yuzhnouralsky2013/chebarkul_21-22.06.2013_asteroidy_i_komety_cheljabinskoe_sobytie.pdf). В статье приведены фотографии редких «магнетитовых космических шариков».
***Фото – 09.** Pictures «space balls» from the area of fall of the Chelyabinsk meteorite (V.Celmovich - hollow magnetite balls formed in flight meteorite found in the snow on the route of flight). Published September 18, 2013, in a newspaper interview that «the Riddles of the Chelyabinsk meteorite open under the Rybinsk» (http://cheremuha.com/obrazovanie-i-nauka/2482-zagadki-chelyabinskogo-meteorita-otkryivayut-pod-ryibinskom.html).*
Микрофотографии «космических шариков» из района падения Челябинского метеорита (по В.А.Цельмовичу - полые магнетитовые шарики, образовавшиеся при полёте метеорита, найденные в снеге по трассе пролёта). Опубликовано 18 сентября 2013 г. в газетном интервью «Загадки Челябинского метеорита открывают под Рыбинском» (http://cheremuha.com/obrazovanie-i-nauka/2482-zagadki-chelyabinskogo-meteorita-otkryivayut-pod-ryibinskom.html).

***The fourth stage (October-December, 2013).** In the middle of October **GTS** has received from **EMP a** parcel with summer mineralogical tests, hothouse glasses and ground adjournment of the lake Chebarcul, selected in an immersing place on a bottom of lake of 600-kg of the ChM drowned man. Within a week hothouse glasses with Chelyabinskites Melt facies have been studied, necessary photos and sketches are made and by means of a diamond saw 12 sections-glasses in the size 24x40 mm for the subsequent researches are prepared.*

Technique microprobe researches. *Six 2-kg-tests have been dried up and quarto. All tests in weight on 500 gr everyone were delete clayey particles, are washed out in flowing water with preservation of fraction more than 10 мк, and then are dried up at temperature more low 60°C. Further have been allocated Grading fractions (more than 10 the size of the mesh, 10-20 mesh, 20-40 mesh, 40-60 mesh, less than 60 mesh). For each of them by means of a manual magnet magnetic fractions were allocated not magnetic, weak and strong electro-magnetic. All 12-20 fractions received for each of 6 tests, were studied under the binocular magnifier mineralogical. It is established that individual Microspherulas have the size 20-40 mesh; is more often they meet in fraction 40-60 mesh and sharply prevail in fraction less than 60 mesh. Microspherulas*

completely are absent in not magnetic fraction and are not characteristic for is weak-electromagnetic fraction. Therefore for preparation TPS= transparent polished section for each of 6 tests it was selected enriched Microspherulas a magnetic-strong-electromagnetic material of two fractions (40-60 mesh and less than 60 mesh). As a result 2 glass plates TPS have been prepared, on each of which is placed on 6 one-dimensional tests enriched chelyabinskites. These materials

(https://www.facebook.com/skublov/media_set?set=a.560222367380033.100001768237075&type=3 - the ***Foto-10*** *see) are presented in the Facebooke-photo-album.*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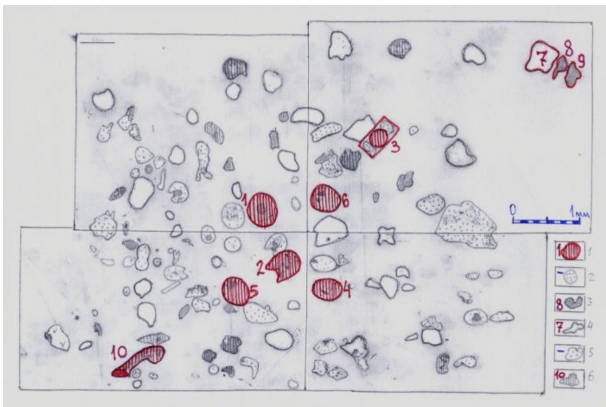
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Фото – 10. The picture is taken in the optical range; the field of vision 3x4 mm. This is the FIRST photo microspherulas chelyabinskite published in our FIRST photo album (https://www.facebook.com/skublov/media_set?set=a.560222367380033.100001768237075&type=3).

Изображение снято в оптическом диапазоне; поле зрения – 3х4 мм. Это – ПЕРВАЯ фотография микросферул челябинскитов, опубликованная в нашем ПЕРВОМ фейсбуковском фотоальбоме

(https://www.facebook.com/skublov/media_set?set=a.560222367380033.100001768237075&type=3).

Фото – 11. The layout of microspherulas chelyabinskites and other mineral grains derived from the TPTS=transparent-polished thin section for electron microprobe research. Material for TPT was magnetic and highly electromagnetic fraction of soil samples from the site JASMINE; size fractions is 40-60 mesh. Legend: 1 - studied microspherulas; 2 - unexplored microspherulas; 3 - grain-schreibersite(?); 4 - the wreckage of highly ferruginous ashes facies chelyabinskites and their numbers; 5 - the wreckage of host rocks, mainly granites, gneisses, schists and minerals; 6 - debris ashes facies chelyabinskites.

Схема размещения микросферул челябинскитов и других минеральных зерен, составленная на фотооснове ППШ=прозрачно-полированного шлифа для микрозондовых исследований. Материалом для ППШ послужила магнитная и сильно электромагнитная фракция почвенной пробы с участка ЖАСМИН; размер фракции составляет 40-60 меш. Обозначения: 1 – номера изученных микросферул челябинскитов; 2 – неизученные микросферулы; 3 – зерно С-шрейберзита (?); 4 – обломки высокожелезистых пепловых фаций челябинскитов и их номера; 5 – обломки вмещающих пород, преимущественно гранитов, гнейсов, кристаллических сланцев и их минералов; 6 – обломки пород пепловой фации челябинскитов.

In connection with absence of any information on a chemical compound chelyabinskites it has been decided to focus attention on test from a site the ***JASMIN*** *(Foto-**11**) and to try to involve in researches of employees several microprobe St.Petersburg's laboratories. The first results (**Foto-12-15**), received on the wave analyzer at Polytechnical institute, have been published on November, 19th 2013 (https://www.facebook.com/skublov/media_set?set=a.562333147168955.100001768237075&type=3), is equal in one month after reception* ***GTS*** *of a parcel from Chelyabinsk. The pivotal conclusion of these researches – is allocated for the first time new type of the natural formations presented Microspherulas; further they began to be considered as* ***Chelyabinskites the first type****.*

The** basic results on Microspherulas of chelyabinskites have been received in Laboratory №3. More detailed studying Spherulas-3 (it is executed 14 microprobe analyses!!! – see **Foto-16**) has allowed to formulate a fundamental conclusion that at a finishing stage of formation Spherulas there was a powerful emission from it ashes-like weight of unusual structure and that (we enter the new term – **Air-Fluidolites**) it is necessary to allocate these formations as **Chelyabinskites the second type**. Further this model has received additional acknowledgement (**Foto-19 and 20**). Hothouse glasses with ferruterous spots have been studied in three independent microprobe laboratories. In Laboratory №5 glasses with a coal dusting (**Foto-25-29**), and in Laboratory №3 – with a gold dusting (**Foto-31-39**) were studied. The comparative analysis received given (**Table-30 and 40**) has allowed to draw a conclusion that composition Melt facies on hothouse glasses of a site the Jasmin are close to composition of **Chelyabinskites** the first and second types. It has allowed to allocate Melt spots on hothouse glasses in separate group – **Chelyabinskites the third type.

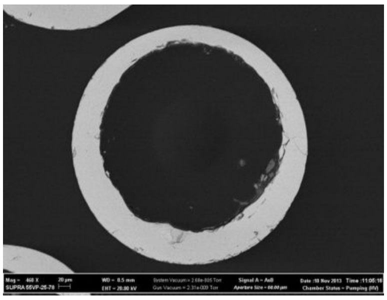
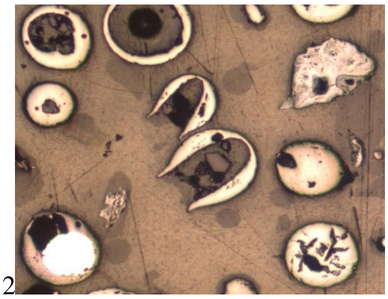
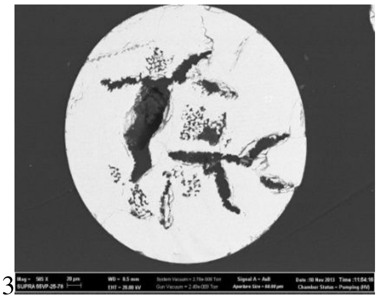
 12  13  14

Фото – 12. *The image in the reflected electrons field of view - 400x600 MK. This is a photo of the FIRST сферулы, which we studied on microprobe in the Laboratory of the Polytechnic Institute in St. Petersburg. The results are published in the SECOND photo album (https://www.facebook.com/skublov/media_set?set=a.562333147168955.100001768237075&type=3). See more photo-11.*
Изображение в отраженных электронах; поле зрения – 400х600 мк. Это фотография ПЕРВОЙ сферулы, которую мы изучали на микрозонде в Лаборатории Политехнического института в С.Петербурге. Результаты опубликованы во ВТОРОМ фейсбуковском фотоальбоме (https://www.facebook.com/skublov/media_set?set=a.562333147168955.100001768237075&type=3). Подробнее – см. фото-11.
Фото – 13. *The picture is taken in the optical range; field of view - 1500x1500 MK. In the center of the photo visible 2 microspherulas chelyabinskites. The biggest of them studied on microprobe in the Laboratory of the Polytechnic Institute in St. Petersburg. The results are published in the SECOND photo album (https://www.facebook.com/skublov/media_set?set=a.562333147168955.100001768237075&type=3). See more photo-11.*
Изображение снято в оптическом диапазоне; поле зрения – 1500х1500 мк. В центре фотоснимка – две подковообразные микросферулы челябинскитов. Самая крупная из них изучена на микрозонде в Лаборатории Политехнического института в С.Петербурге. Результаты опубликованы во ВТОРОМ фейсбуковском фотоальбоме (https://www.facebook.com/skublov/media_set?set=a.562333147168955.100001768237075&type=3). Подробнее – см. фото-11.
Фото – 14. *The image in the reflected electrons field of view - 320x430 MK. This is a picture of the FOURTH microspherulas, which we studied on microprobe in the Laboratory of the Polytechnic Institute in St. Petersburg. The results are published in the SECOND photo album (https://www.facebook.com/skublov/media_set?set=a.562333147168955.100001768237075&type=3). See more photo-11.*
Изображение в отраженных электронах; поле зрения – 320х430 мк. Это фотография ЧЕТВЕРТОЙ микросферулы, которую мы изучали на микрозонде в Лаборатории Политехнического института в С.Петербурге. Результаты опубликованы во ВТОРОМ фейсбуковском фотоальбоме (https://www.facebook.com/skublov/media_set?set=a.562333147168955.100001768237075&type=3). Подробнее – см. фото-11.

***Geochemical types of Chelyabinskites.** All three genetic types of **Chelyabinskites** are characterised by an unidirectional tendency of change of regenerative conditions on oxidising in the course of formation chelyabinskites . Therefore it is possible to take the given sign for a basis at allocation of geochemical types: 1 = Fe - native; 2 = Fe+FeO - native and oxide; 3 = FeO - mainly oxide; 4=Fe2O3 - mainly oxide; 5= chelyabinskites silicate-ferruterous; 6= chelyabinskites silikatno-ferruterous Air-Fluidolites. At allocation of the listed geochemical types we had been used methods of the multidimensional statistical analysis, including and methods of the factorial analysis (http://www.geokniga.org/books/4531).*

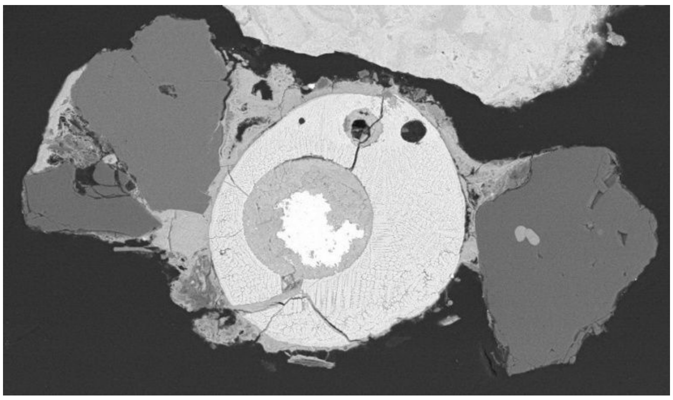
Chelyabinskites the first and second types - microspherulas and Ash facies Air-Fluidolites.

Preliminary results microprobe studying Spherulas. *We will return once again to consideration of the results received by us at Polytechnical institute - https://www.facebook.com/skublov/media_set?set=a.562333147168955.100001768237075&type=3 . We will notice that Microspherulas on the* **size** *practically do not differ among themselves. Their diameter varies from 200 to 420 micron. Their* ***form*** *or ideal spherical, or with deviations towards an ellipse no more than 10 %. We at the given stage of researches allocate following* **types** *Microspherulas:* ***A*** *= closed hollow (sf-1);* ***B*** *= closed blown up (sf-4);* ***C*** *= closed caked (sf-3);* ***D*** *= half-closed, with Fluidolites (sf-5);* ***E*** *= open, with xenogenic fragments (sf-2). On character of internal* **microash value** *they are divided into two types:* ***A*** *= not zone (sf-1, 2, 4);* ***B*** **=** *zone, with division on two (sf-5) or three (sf-3) spherical zone.*

Microstructure Spherulas *extremely diverse. Meet as vitreous difference (SF-1,2), and structure of the collapse of the solid solutions (SF - 5). Xenogenic fragments of 10-40 micron associated with open Spherulas (SF-2) and caked with Spherulas (SF-3); the rubble presented quartz, feldspar, dark micas and biotite schist. All 13 analyses microspherulas suggest possible to consider them as ferrous Spherulas with small portion of alumina-silicate material. All chemical elements here are divided into three groups associated with iron (Ti-Cr-Mn-Fe-Cu), alumino-silicates (Al-Si-K-Ca) and volatile components (P-S-Cl). Iron is present in compounds with different valence; distinguished Spherulas with metal and Fe-oxide.*

Available materials, refracted through the prism of a multi-year study of the ***Tunguska event*** *(http://www.hodka.net/sb2012.pdf , page 172-209), makes it a purely hypothetical form to the following conclusions: 1 - microspherulas formed during 5-32 seconds in the morning on February 15, 2013 at the time of the Chelyabinsk meteorite in the atmosphere; 2 - the education of their likely connected not so much with the meteorite, but with «radiant burn» from the first major outbreak of* ***ChM****; 3 - formation microspherulas was in an extremely non-equilibrium subsurface redox conditions with the participation of the P, S, Cl, and the alleged hydrogen and hydrocarbons; 4-a source of iron in the Spherulas may be as a meteorite, and the mantle coal plume, as evidenced by the Association of chemical elements (Fe, Mn, Ti, Cu, Cr).*

The main results of microprobe study. *In* **Laboratory-3** *were studied in detail three microspherulas (№3, 5, 6) - see* **Photo-16, -17, -18** *and* **Tables 22, 23, 24.**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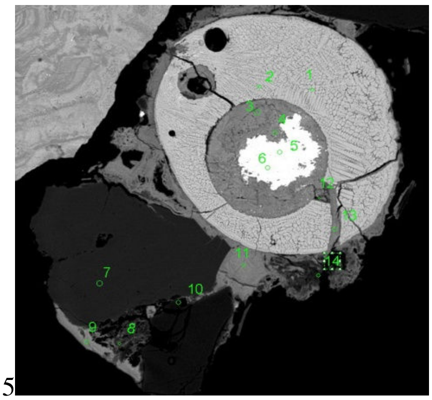
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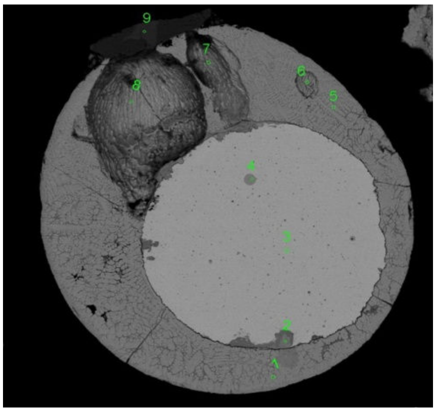

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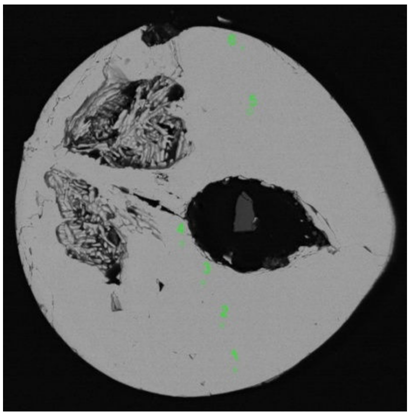

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Фото – 15. *The image in the reflected electrons field of view - 400x600 MK. Spherulas № 3 - a vivid example of successful spatial imposition ASHES facies chelyabinskites with microspherulas growth. First published in the SECOND photo-album (https://www.facebook.com/skublov/media_set?set=a.562333147168955.100001768237075&type=3).*
Изображение в отраженных электронах; поле зрения – 400х600 мк. Сферула № 3 – яркий пример удачного пространственного совмещения ПЕПЛОВОЙ фации челябинскитов с микросферульным новообразованием. Впервые опубликовано во ВТОРОМ Фейсбуковском фото-альбоме (https://www.facebook.com/skublov/media_set?set=a.562333147168955.100001768237075&type=3).

Фото – 16. *The image in the reflected electrons field of view - 300x300 MK. Shows the lower part of MICROSPHERULAS-3 with point numbers microprobe analysis. The results of the analyses are given in tables 22-24.*
Изображение в отраженных электронах; поле зрения – 300х300 мк. Показана нижняя часть СФЕРУЛЫ-3 с номерами точек микрозондового анализа. Результаты анализов приведены в таблицах 22-24.

Фото – 17. *The image in the reflected electrons field of view - 350x400 MK. In Spherulas №5 clearly expressed liquation zoning. Central zone consists of native iron (point 3, see table 22-23); it highlights the numerous tiny microspherulas, enriched with titanium (point 4). The intermediate region is rich in titanium and manganese. In the peripheral zone of the observed maximum concentration of Mn (table. 22).*
Изображение в отраженных электронах; поле зрения – 350х400 мк. В сферуле №5 отчетливо выражена ликвационная зональность. Центральная зона сложена самородным железом (точка 3, см. табл 22-23); в ней отмечаются многочисленные мельчайшие микросферулы, обогащенные титаном (точка 4). Промежуточная зона сложена вюститом, обогащенным титаном и марганцем. В периферической зоне отмечается максимальная концентрация Mn (табл. 22).

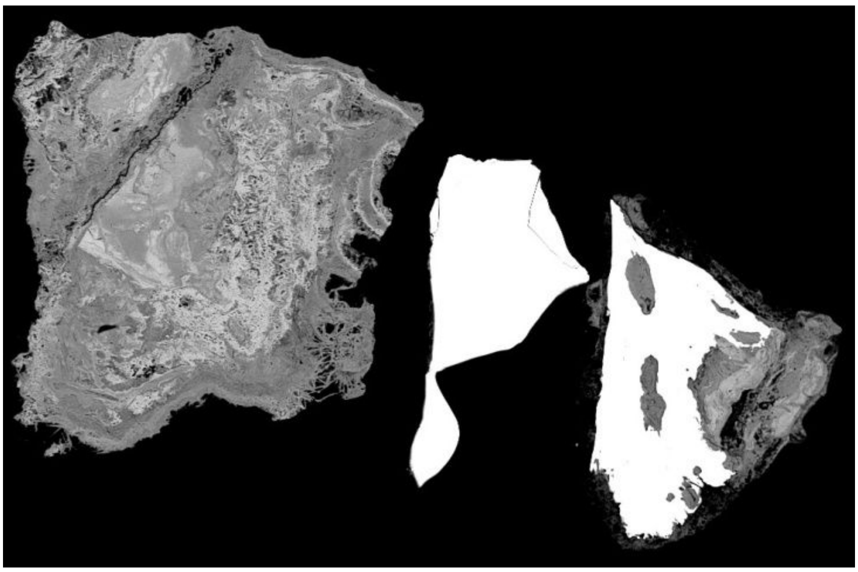
Фото – 18. *The image in the reflected electrons field of view - 600x850 MK. In microspherulas №7, folded FeO with a surprisingly constant chemical composition, are allocated 3 large cavity. Two of them (in the left part of the photo) filled with crystalline FeO, and the right extreme emptiness contains a grain of Native SILICON (see table. 22, analysis №30) of size above 40 MK.*
Изображение в отраженных электронах; поле зрения – 600х850 мк. В микросферуле №7, сложенной вюститом с удивительно постоянным химическим составом, выделяются 3 крупные миароловые пустотки. Две из них (левая часть фотографии) заполнены кристаллическим вюститом, а правая крайняя пустота содержит зерно КРЕМНИЯ самородного (см. табл. 22, анализ №30) размером более 40 мк.

Spherulas-3 *previously been studied in the Laboratory of the Polytechnic Institute (http://mnt.ftim.spbstu.ru/index.php/kafedra-segodnya/laboratorii/mikroskopii-i-mikroanaliza); attention was drawn to the native iron in the core Spherulas, pronounced zoning and on a multi-stage of its formation. The reason sintering Spherulas and the host rock was not discussed due to the limited time of operation on the device. When microprobe studies in Laboratory-3 we set a goal to obtain new data on composition Spherulas and test the proposition that the sintered cement around Spherulas is gas-fluid phase last final stage of formation of microspherulas. As shown by the studies:* ***1*** *- analytic laboratories Polytechnic Institute and Laboratory-3 allow to speak about the good convergence of the results and of the possibility in the future to use various laboratory centers;* ***2*** *- the zone structure Spherulas proves to be true, the structure of which three phases responds native iron (a central zone), oxide phases (an intermediate zone) and oxide gland (a peripheral zone);* ***3*** *- among xenogenic fragments discovered potassium feldspar;* ***4*** *- the first time it is allocated new petrographical group of rocks –* ***Air-Fluidolites*** *(fluidolites formed in the air environment), which are represented significantly glandular and carbon-glandular varieties; later, was established their genetic relationship with Spherulas and they were allocated in* ***Chelyabinskites third type*** *= breed Ash facies;* ***5*** *-* ***Air-Fluidolites*** *characterized by the extremely uneven distribution and high content of chemical elements, as the main (* ***C*** *- with up to 60%;* ***Fe*** *- 47%) and minor (****P*** *- 9%;* ***Si*** *- 6,1;* ***Ca*** *- 5.0;* ***Al*** *- 1,7;* ***S*** *-1,3;* ***Cl*** *- up to 0.5%);* ***6*** *- the explosive nature of the proceeds* ***Fluidolites*** *material from Spherulas emphasizes micro-cracks, micro-texture formations and veins.*

Spherulas-5. *After work in the Polytechnic Institute were not until studied products of the third, final stage of formation of microspherulas. The result of further research confirmed earlier findings and established that:* ***1*** *- microspherulas sharply distinguished pronounced geochemical specialization - in it there is a high concentration of* ***Mn*** *(up 4 %) and* ***Ti*** *(1.7 %);* ***2*** *- central zone composed of native Fe without impurities Mn and Ti; it is characterised by numerous microspherulas size of 1-3 micron, rarely to 12 MK enriched Ti, S, Ca;* ***3*** *- peripheral area microspherulas has* ***Wüstite*** *composition (FeO) and is full of elements of silicate number (Mn - up to 2.57%; Ti - 2,06; Si - 1,79;Al 1,02; Mg - 0.64 %);* ***4*** *- ferrous* ***Air-Fluidolites*** *final stage were formed during a time of sharply increase reducing conditions, as evidenced by the natural decrease of the contents of oxygen (8,5-7,1-1,7 %), silicon and calcium at the transition from small veins to large;* ***5*** *- outlet* ***Fluidolites*** *sealed fragment of K-feldspar.*

Spherulas-6 *size 320x350 micron aroused our interest is the fact that under the electron microscope in it were found three isolated (?) cavity size of 80-120 microns, apparently sharply differing in mineral composition. In the reflected light of these differences are barely visible. When using the program Photoshop method exposure compensation, we established micro-zoning in the structure of spherulas. It was suggested that different parts of the microspherulas will vary according to the ratio of iron and oxygen. To check this assumption was passed profile of 6 points. The results of the analyses show a remarkable constancy of the composition microspherulas. In General, they are close to the composition of* ***Wüstite****. Slight differences in the intensity of the peaks carbon suggest that the peripheral zones Spherulas-6 will be enriched in heavy hydrocarbons; this requires further study. Completely unexpected discovery of native silicon in one of the hollows Spherulas-6 (****Foto-18****).*

Air-Fluidolites of Chelyabinskites Ash facies *associated with microspherulas, studied in less detail. If we consult the spherules-3 (****Foto-16****) and the results of the analyses Fluidolites (****table 22, in line 8-14****), we can detect a clear division into two groups (****table 23, lines 48-49****) - significantly glandular, with elevated concentrations of P, Si, Ca, Al, S (****Grp=5****), and iron-carbon, P, Si, Ca (****Grp=6****). The most important indicator chemical element Air-Fluidolites is phosphorus concentrations that reach 9%.The largest grain ferruginous Air-Fluidolites not related to the spherules (****grain-7, Photo-19****), the phosphorus content is only 1% (****table 22, line-34****); the bulk of the grain (****Grp=7****) folded oxide iron presumably* ***Maghemite*** *composition. Two other grain Fluidolites not related to the spherules (****grain-9 and 10; Photo-19 and 20****) including fragments* ***wustite*** *and* ***native iron****, do not contain phosphorus and excreted by abnormally high contents of Si, Al, Ca, K (****table 23, line 27, 28, 51; Grp=8****), suggesting that part of the crustal material origin (granite and gneiss) with their education.*



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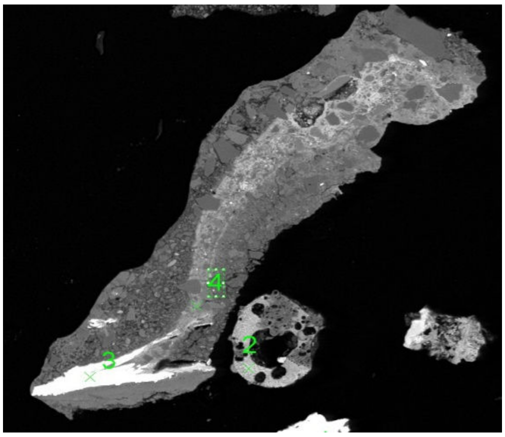

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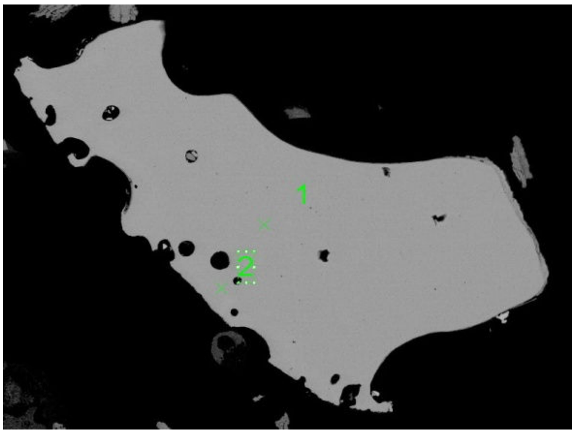

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Фото – 19. *The image in the reflected electrons field of view - 700 * 700 MK. Left to right - grain No. 7-8-9 respectively ASHES facies chelyabinskites, With carbon-schreibersite(?) and grain ASH with a large fragment of wustite.*
Изображение в отраженных электронах; поле зрения – 700х700 мк. Слева направо – зёрна № 7-8-9 соответственно ПЕПЛОВОЙ фации челябинскита, углеродистого шрейберзита (?) и зерна ПЕПЛА с крупным ксеногенным обломком вюстита.
Фото – 20. *The image in the reflected electrons field of view - 750x750 MK. Chip ASH clastic structure and with a fragment of the native iron containing rare admixture Pb (0,42% - see table. 22).*
Изображение в отраженных электронах; поле зрения – 750х750 мк. Обломок ПЕПЛА с микрокластической структурой и с ксеногенным обломком самородного железа, содержащего редчайшую примесь свинца (0,42% - см. табл. 22).
Фото – 21. *The image in the reflected electrons field of view - 700x900 MK. Large chip native iron without a trace elements..*
Изображение в отраженных электронах; поле зрения – 700х900 мк. Крупный обломок самородного железа, не содержащего микропримесей.

Minerals, associating with Chelyabinskites first type, are divided on two groups - the usual minerals enriched Fe, and rare minerals. Grain-11 (Foto-21) it is combined by the native iron which is not containing any elements-impurity. Grain-10 (Foto-20, Table-24) also is combined by native iron, however in it are marked impurity Mn, Si, Pb, K. In grain-9 (Foto -19) the large fragment is presented wustite, Among rare minerals first of all it is necessary to note - Native Silicon, present at a kind of the isolated grain in the size about 40 micron in миароловой пустотке Cpherult-6 (Foto-18 and Table-22, a line-30). The special attention is deserved by isolated grain chip-8 (Foto-19) in the size 150x300 MK. Its structure is defined under high maintenances Fe, Ni, P, C (Table-22, lines 35-37). At recalculation on безуглеродное substance its structure (Fe9Ni5P6) most close responds a rare mineral шрейберзиту (Fe, Ni)$_3$P), however formular factors allow to refuse such interpretation. If to follow fosfid-carbide to model taking into account the amendment on a carbon dusting it is possible to assume a bit different formula of a mineral Schreibersite (Fe_2NiPC_3). It is not excluded that at the further more detailed researches the new mineral from group of fosfid-carbides which can be considered as carbonaceous analogue Schreibersite will be allocated.

1 NN	2 NL	3 Tipe	4 C	5 O	6 Na	7 Mg	8 Al	9 Si	10 P	11 S	12 Cl	13 K	14 Ca	15 Ti	16 Mn	17 Fe	18 Ni	19 Pb	20 GG	21 Interpretation	22 Notes
1	0301	1		19,65			0,92	1,36								78,07			3	Fe+FeO with Si,Al	Сферула-3, периферическая зо
2	0302	1		19,07			0,76	0,74								79,43			3	Fe+FeO with Al,Si	Сферула-3, периферическая зо
3	0303	1		32,9				0,81					0,72			65,57			6	Fe2O3 with Si,Ca	Сферула-3, промежуточная зон
4	0304	1		31,14				1,7								67,16			6	Fe2O3 with Si	Сферула-3, промежуточная зон
5	0305	1														100			1	Fe	Сферула-3, центральная зона
6	0306	1														100			1	Fe	Сферула-3, центральная зона
7	0307	4		33,96	1,23		12,68	37,65				14,58							16	K-Feldspat	Минерал в флюидолите сферу
8	0308	2		32,62			1,74	5,55	8,95	1,26	0,49		5,02			44,36			8	Fe-fld with P,Si,Ca,Al,S,C	Флюидолит на сферуле-3
9	0309	2		33,05				2,48	0,63	1,35						62,5			8	Fe-fld with Si,S,P	Флюидолит на сферуле-3
10	0310	2	62,02	10,17			0,3	6,14		0,37						21,01			9	C-Fe-fld with Si	Флюидолит на сферуле-3
11	0311	2		37,21				2,02					0,9			59,87			8	Fe-fld with Si,Ca	Флюидолит на сферуле-3
12	0312	2	28,93	19,89			0,64	1,96		0,26	0,4	0,28	0,84		0,61	46,18			9	C-Fe-fld with Si,Ca,Al,Mn	Флюидолит на сферуле-3
13	0313	2	14,64	34,41				1,44	0,99		1,51		0,52			46,48			9	C-Fe-fld with Cl,Si,P,Ca	Флюидолит на сферуле-3
14	0314	2	35,81	28,17		0,55		0,75	4,41	0,65			3,17			26,48			9	C-Fe-fld with P,Ca,Si,S,M	Флюидолит на сферуле-3
15	0501	1		20,5		0,64	1,02	1,79						2,01	2,17	71,87			5	FeO with Mn,Ti,Si,Al,Mg	Сферула-5, промежуточная зон
16	0502	1		26,71						0,67		0,3	0,47			71,85			5	FeO with S	Сферула-5, центральная зона
17	0503	1														100			1	Fe	Сферула-5, центральная зона
18	0504	1		20,2				1,8					0,62	1,67		72,52			5	FeO with Si,Ti,Ca	Сферула-5, центральная зона
19	0505	1		20,64		0,45	0,48							2,06	2,57	73,79			5	FeO with Mn,Ti	Сферула-5, промежуточная зон
20	0506	1		8,48				4,02					0,95	2,71	3,61	80,23			2	Fe+FeO with Si,Mn,Ti,Ca	Сферула-5, промежуточная зон
21	0507	1		7,09				2,46					0,94	2,21	3,64	83,65			2	Fe+FeO with Mn,Si,Ti,Ca	Сферула-5, периферическая зо
22	0508	1		1,66				0,27						1,73	4,04	92,3			2	Fe+FeO c Mn,Ti	Сферула-5, периферическая зо
23	0509	4		34,09	1,33		12,57	39,33				12,68							16	K-Feldspat	Минерал на сферуле-5
24	0601	1		23,2												76,8			4	FeO	Сферула-6, низы разреза
25	0602	1		23,5												76,5			4	FeO	Сферула-6, низы разреза
26	0603	1		23,35												76,65			4	FeO	Сферула-6, середина разреза
27	0604	1		23,27												76,73			4	FeO	Сферула-6, середина разреза
28	0605	1		23,5												76,5			4	FeO	Сферула-6, верхи разреза
29	0606	1		24,17												75,83			4	FeO	Сферула-6, верхи разреза
30	0607	3						100											10	Native Silicon	Сферула-6, зерно Si в миароле
31	0609	3		23,07												76,93			13	FeO	Сферула-6, кристаллы FeO в м
32	0702	2		23,8												76,2			7	Fe-fld	Зерно-7 = Fe - флюидолит
33	0703	2		31,39												68,61			7	Fe-fld	Зерно-7 = Fe - флюидолит
34	0704	2		29,15			0,4	1,3	0,94				0,86			67,34			8	Fe-fld with Si,P,Ca	Зерно-7 = Fe - флюидолит
35	0805	5	23,06						13,3							39,69	23,94		15	C - Schreibersite ?	Зерно-8 = С-Шрейберзит ?
36	0806	5							18,7							50,43	30,86		14	Schreibersite ?	Зерно-8 = Шрейберзит ?
37	0807	5							18,8							49,65	31,59		14	Schreibersite ?	Зерно-8 = Шрейберзит ?
38	0908	4		20,24												79,76			13	FeO	Зерно-9 = включение в флюид
39	0908	2		29,82		1	10,51	25,8				1,62	2,98			28,28			8	Fe-fld with Si,Al,Ca,K	Зерно-9 = флюидолит
40	1003	4						0,95				0,22		0,29	1,16	96,97		0,42	12	Fe with Mn,Si,Pb	Зерно-10 = включение в флюи
41	1004	2		32,58		0,66	6,55	27,16				4,49	0,5			28,06			8	Fe-fld with Si,Al,K,Mg,Ca	Зерно-10 = флюидолит
42	1101	5														100			11	Fe	Зерно-11 = обломок полусфер
43	1102	5														100			11	Fe	Зерно-11 = обломок полусфер

Таблица – 22. Results of electron microprobe analysis microspherulas and associated entities (spherulas №3, 5, 6 and grain No. 7-11). *Content of chemical elements are given in the masses. %. Legend: NL - laboratory number of samples; the first two figures tell about the grain, and the last two - room number the analytical point; TIPE - types of the studied entities (1=spherulas; 2=fluidolites; 3=grain native silicon; 4=K-feldspar; 5=schreibersite (?)); GG - number of geochemical aggregates, in accordance with the table. 23 and 24.*

Результаты микрозондового анализа микросферул челябинскитов и ассоциирующих с ними образований (сферулы №3, 5, 6 и зерна №7-11). *Содержания химических элементов даны в масс. %. Обозначения:* ***NL –*** *лабораторный номер пробы; первые две цифры сообщают о номере зерна, а две последние – о номере аналитической точки;* ***TIPE*** *– типы изучаемых образований (1=сферулы; 2=флюидолиты; 3=зерно самородного кремния; 4=калиевый полевой шпат; 5=шрейберзит (?));* ***GG*** *– номера геохимических совокупностей, в соответствии с табл. 23 и 24.*

1 N	2 NN	3 NL	4 Tipe	5 C	6 O	7 Na	8 Mg	9 Al	10 Si	11 P	12 S	13 Cl	14 K	15 Ca	16 Ti	17 Mn	18 Fe	19 Ni	20 Pb	21 Group	22 Interpretation	23 Notes
1	5	)305	1														100			1	Fe	Сферула-3, центральная зона
2	6	)306	1														100			1	Fe	Сферула-3, центральная зона
3	17	)503	1														100			1	Fe	Сферула-5, центральная зона
4	20	)506	1		8,48				4,02					0,95	2,71	3,61	80,23			2	Fe+FeO with Si,Mn,Ti,Ca	Сферула-5, промежуточная зо
5	21	)507	1		7,09				2,46					0,94	2,21	3,64	83,65			2	Fe+FeO with Mn,Si,Ti,Ca	Сферула-5, периферическая з
6	22	)508	1		1,66				0,27						1,73	4,04	92,3			2	Fe+FeO с Mn,Ti	Сферула-5, периферическая з
7	1	)301	1		19,65			0,92	1,36								78,07			3	Fe+FeO with Si,Al	Сферула-3, периферическая з
8	2	)302	1		19,07			0,76	0,74								79,43			3	Fe+FeO with Al,Si	Сферула-3, периферическая з
9	24	)601	1		23,2												76,8			4	FeO	Сферула-6, низы разреза
10	25	)602	1		23,5												76,5			4	FeO	Сферула-6, низы разреза
11	26	)603	1		23,35												76,65			4	FeO	Сферула-6, середина разреза
12	27	)604	1		23,27												76,73			4	FeO	Сферула-6, середина разреза
13	28	)605	1		23,5												76,5			4	FeO	Сферула-6, верхи разреза
14	29	)606	1		24,17												75,83			4	FeO	Сферула-6, верхи разреза
15	15	)501	1		20,5		0,64	1,02	1,79						2,01	2,17	71,87			5	FeO with Mn,Ti,Si,Al,Mg	Сферула-5, промежуточная зо
16	16	)502	1		26,71						0,67		0,3	0,47			71,85			5	FeO with S	Сферула-5, центральная зона
17	18	)504	1		20,2				1,8					0,62	1,67		72,52			5	FeO with Si,Ti,Ca	Сферула-5, центральная зона
18	19	)505	1		20,64		0,45	0,48							2,06	2,57	73,79			5	FeO with Mn,Ti	Сферула-5, промежуточная зо
19	3	)303	1		32,9				0,81					0,72			65,57			6	Fe2O3 with Si,Ca	Сферула-3, промежуточная зо
20	4	)304	1		31,14				1,7								67,16			6	Fe2O3 with Si	Сферула-3, промежуточная зо
21	32	)702	2		23,8												76,2			7	Fe-fld	Зерно-7 = Fe - флюидолит
22	33	)703	2		31,39												68,61			7	Fe-fld	Зерно-7 = Fe - флюидолит
23	8	)308	2		32,62			1,74	5,55	8,95	1,26	0,49		5,02			44,36			8	Fe-fld with P,Si,Ca,Al,S,C	Флюидолит на сферуле-3
24	9	)309	2		33,05				2,48	0,63	1,35						62,5			8	Fe-fld with Si,S,P	Флюидолит на сферуле-3
25	11	)311	2		37,21				2,02					0,9			59,87			8	Fe-fld with Si,Ca	Флюидолит на сферуле-3
26	34	)704	2		29,15			0,4	1,3	0,94				0,86			67,34			8	Fe-fld with Si,P,Ca	Зерно-7 = Fe - флюидолит
27	39	)908	2		29,82		1	10,51	25,8				1,62	2,98			28,28			8	Fe-fld with Si,Al,Ca,K	Зерно-9 = флюидолит
28	41	1004	2		32,58		0,66	6,55	27,16				4,49	0,5			28,06			8	Fe-fld with Si,Al,K,Mg,Ca	Зерно-10 = флюидолит
29	10	)310	2	62,02	10,17			0,3	6,14		0,37						21,01			9	C-Fe-fld with Si	Флюидолит на сферуле-3
30	12	)312	2	28,93	19,89			0,64	1,96		0,26	0,4	0,28	0,84		0,61	46,18			9	C-Fe-fld with Si,Ca,Al,Mn	Флюидолит на сферуле-3
31	13	)313	2	14,64	34,41				1,44	0,99		1,51		0,52			46,48			9	C-Fe-fld with Cl,Si,P,Ca	Флюидолит на сферуле-3
32	14	)314	2	35,81	28,17		0,55		0,75	4,41	0,65			3,17			26,48			9	C-Fe-fld with P,Ca,Si,S,M	Флюидолит на сферуле-3
33	30	)607	3						100											10	Native Silicon	Сферула-6, зерно Si в миароле
34	42	1101	5														100			11	Fe	Зерно-11 = обломок полусфер
35	43	1102	5														100			11	Fe	Зерно-11 = обломок полусфер
36	40	1003	4						0,95				0,22		0,29	1,16	96,97		0,42	12	Fe with Mn,Si,Pb	Зерно-10 = включение в флюи
37	31	)609	3		23,07												76,93			13	FeO	Сферула-6, кристаллы FeO в м
38	38	)908	4		20,24												79,76			13	FeO	Зерно-9 = включение в флюид
39	36	)806	5							18,7							50,43	30,86		14	Schreibersite ?	Зерно-8 = Шрейберзит ?
40	37	)807	5							18,8							49,65	31,59		14	Schreibersite ?	Зерно-8 = Шрейберзит ?
41	35	)805	5	23,06						13,3							39,69	23,94		15	C - Schreibersite ?	Зерно-8 = С-Шрейберзит ?
42	7	)307	4		33,96	1,23		12,68	37,65				14,58							16	K-Feldspat	Минерал в флюидолите сферу
43	23	)509	4		34,09	1,33		12,57	39,33				12,68							16	K-Feldspat	Минерал на сферуле-5

Таблица – 23. Results of electron microprobe analysis microspherulas and associated entities (spherulas №3, 5, 6 and grain No. 7-11). *This copy of the table. 22 differs only by the fact that all samples sorted by number geochemical groups.*
Результаты микрозондового анализа микросферул челябинскитов и ассоциирующих с ними образований (сферулы №3, 5, 6 и зерна №7-11). *Эта копия табл. 22 отличается только тем, что все пробы отсортированы по номерам геохимических совокупностей.*

1 NN	2 ХЭ	3 GG-1	4 GG-2	5 GG-3	6 GG-4	7 GG-5	8 GG-6	9 GG-7	10 GG-8	11 GG-9	12 GG-10	13 GG-11	14 GG-12	15 GG-13	16 GG-14	17 GG-15	18 GG-16
1	C									**35,35**						**23,06**	
2	O		**5,74**	**19,36**	**23,50**	**22,01**	**32,02**	**27,59**	**32,41**	**23,16**				**21,66**			**34,03**
3	Na																**1,28**
4	Mg					*0,27*			*0,28*	*0,14*							
5	Al			**0,84**		*0,38*			3,20	*0,24*							**12,63**
6	Si		**2,25**	**1,05**		*0,90*	**1,26**		**10,72**	**2,57**	**100,00**		**0,95**				**38,49**
7	P								1,75	*1,35*					**18,73**	**13,31**	
8	S					*0,17*			*0,44*	**0,32**							
9	Cl								*0,08*	*0,48*							
10	K					*0,08*			*1,02*	*0,07*			**0,22**				**13,63**
11	Ca		*0,63*			*0,27*	*0,36*		**1,71**	**1,13**							
12	Ti		**2,22**			**1,44**							**0,29**				
13	Mn		**3,76**			1,19				*0,15*			**1,16**				
14	Fe	**100,00**	**85,39**	**78,75**	**76,50**	**72,51**	**66,36**	**72,41**	**48,40**	**35,04**		**100,00**	**96,97**	**78,34**	**50,04**	**39,69**	
15	Ni														**31,23**	**23,94**	
16	Pb												**0,42**				
	Tipe	**Sph.**	**Sph.**	**Sph.**	**Sph.**	**Sph.**	**Sph.**	*Fluidolite*	*Fluidolite*	*Fluidolite*	**Miner.**	**Miner.**	**Miner.**	**Miner.**	**Miner.**	**Miner.**	**Miner.**
	Name	*Fe*	*Fe+FeO*	*Fe+FeO*	*FeO*	*FeO*	*Fe2O3*	*Fe2O3*	*Fe2O3*	*C+Fe2O3*	Silicon	*Fe*	*Fe*	*FeO*	Schreibersite ?	C-Schreibersite ?	*K-F-Spat*
	Addition	-	*MnSiTi*	*SiAl*	-	*TiMn*	*Si*	-	*SiCaAlPK*	*SiPCa*	-	-	*MnSiPb*	-	-	-	-
	Objects	3, 5	5	3	6	5	3	7	3, 7-9-10	3	6	11	10	6, 9	8	8	**3, 5**
	N-anal	3	3	2	6	4	2	2	6	4	1	2	1	1	2	1	**2**

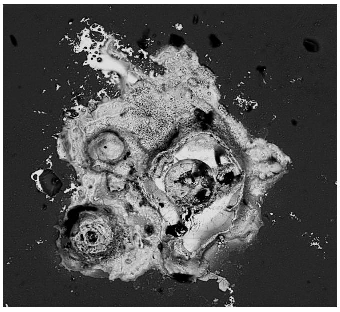
***Таблица – 24.* The results of the interpretation of the data in table 23 (are average contents of chemical elements for GG - 16 samples of different geochemical aggregates).** *All samples are grouped by type (Spherulas--Air-Fluidolites=ash facies chelyabinskites - Minerals) and ordered by the degree of iron oxidation and mineral composition. For all samples are the main and related chemical elements, and also the number of analyses (N-anal). A variety of fonts highlighted the degree of reliability of average values: bold is a chemical element found in all samples; confidence zone averages can be calculated according to the relevant tables of statistics; standard - in most samples to determine the content of the particular item; the average value of indicative and several overwork; italics - the average value for single samples underestimated and can be used only for preliminary judgments about the level of accumulation of the studied chemical element.*

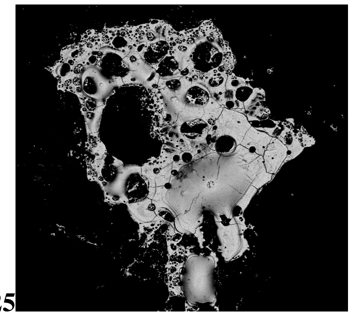
Результаты интерпретации данных таблицы 23 (приведены средние значения содержаний химических элементов для GG – 16 выборок различных геохимических совокупностей). *Все выборки сгруппированы по типам (Сферулы – Аэрофлюидолиты=пепловые фации челябинскитов – Минералы) и упорядочены по степени окисленности железа и минеральному составу. Для всех выборок приведены главные и сопутствующие химические элементы, а также указано число анализов (N-anal). Различными шрифтами выделена степень достоверности определения средних значений:* ***жирный*** *– химический элемент обнаружен во всех пробах; доверительные зоны средних могут быть рассчитаны по соответствующим статистическим таблицам;* ***стандартный*** *– в большинстве проб определено содержание конкретного элемента; среднее значение ориентировочное и несколько заниженное; курсив – среднее значение для единичных проб занижено и может быть использовано только для предварительного суждения об уровне накопления изучаемого химического элемента.*

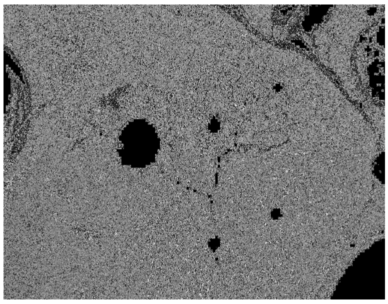
Chelyabinskites Melt facies

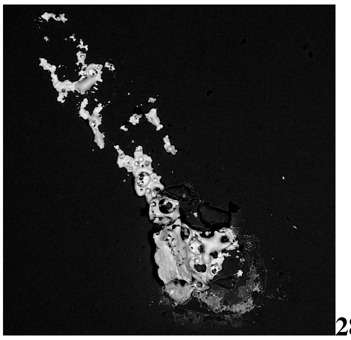
The discussion below ***Chelyabinskites of the third type*** *were found on the site* ***Jasmine*** *(coordinates - 55,119586o N and 61,336882o E). However, this does not mean that they are not kept on other household plots, Chelyabinsk. Just need to look hard to find them.*

In the ***Laboratory-5*** *explore three spots* ***chelyabinskites of the third type.*** *Photos made in the reflected electrons clearly shows that the patches have as isometric shape and size of 700 * 700 MC (****Foto-25-26****) and strongly extended at a rate of 300*1200 MK (****Foto-28****). The most characteristic morphological feature Chelyabinskites the third type - the abundance of textures quickly harden melt with many gas bubbles, rare tiny cracks and abundance of sinter forms to judge about micro-staging when the melt solidifies. On detailed photographs (****Foto-27 and 29****) shows the maximum diversity of micro-textured images. In most cases, bright white spots and the smallest Spherulas (****Foto 27****) correspond to the composition of Fe+FeO, and light gray segregations have* ***Iotsit*** *composition FeO. Most dark areas on the composition meet nitrous ferric likely* ***Maghemite*** *type.*


25


26


27


28

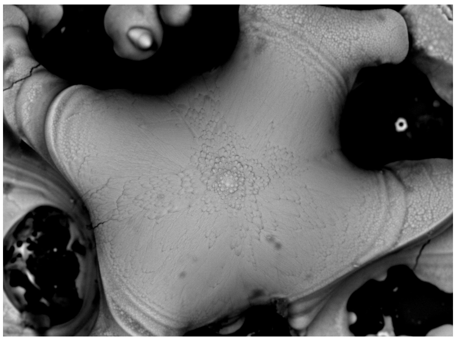

29

Фото – 25. *The image in the reflected electrons field of view - 700 * 700 MK. Large stain chelyabinskites with 3 centers and with a tendency to education microspherulas.*
Изображение в отраженных электронах; поле зрения – 700х700 мк. Крупное пятно челябинскита с разностадийными образованиями и с 3 центрами, намечающими тенденцию к образованию микросферул.

Фото – 26. *The image in the reflected electrons field of view - 700 * 700 MK. The most typical spot melt chelyabinskites. Visible differences in the degree of gas saturation of these units.*
Изображение в отраженных электронах; поле зрения – 700х700 мк. Наиболее типичное пятно расплавного челябинскита. Видны различия в степени газонасыщенности этих образований.

Фото – 27. *The image in the reflected electrons field of view - 100x130 MK. This fragment of the picture-26. To be very successful demonstration of the cavitation processes in the crystallization chelyabinskites and isolation of the smallest microspherulas sharply rehabilitation native iron (bright white balls).Изображение в отраженных электронах; поле зрения – 100х130 мк. Это фрагмент фотографии-26. На редкость удачная демонстрация кавитационных процессов при кристаллизации челябинскитов и обособления мельчайших микросферул резко восстановительного самородного железа (яркие белые шарики).*

Фото – 28. *The image in the reflected electrons field of view - 1100x1100 MK. Linearly oriented chain of small spots of melt chelyabinskites.*
Изображение в отраженных электронах; поле зрения – 1100х1100 мк. Линейно ориентированная цепочка мелких пятен расплавных челябинскитов.
Фото – 29. *The image in the reflected electrons field of view - 70x100 MK. Fragment spots chelyabinskites (photo-28). Clearly pronounced textural features of the cavitation processes of crystallization of the melt.*
Изображение в отраженных электронах; поле зрения – 70х100 мк. Фрагмент пятна челябинскитов (фото-28). Отчетливо выражены текстурные особенности кавитационных процессов кристаллизации расплава.

*Statistical analysis of 18 microprobe analyses of chelyabinskites melt facies performed in the Laboratory-5 (**Table 30**) allows to draw the following preliminary conclusions:*

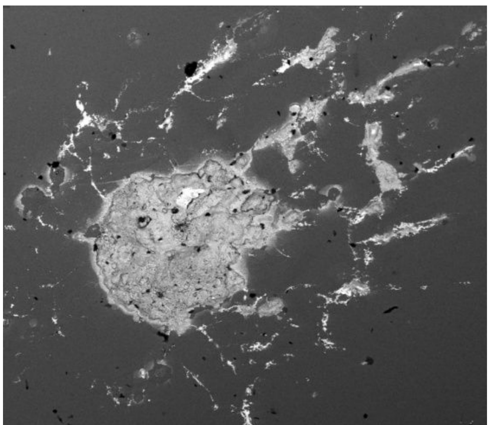
1 NN	2 NN - GeSk	3 Si	4 Al	5 Fe	6 Mn	7 Ca	8 Zn	9 P	10 O	11 S	12 Cu	13 Ti	14 Mg	15 Cr	16 Ni	17 Cl	18 V	19 Association Chemical Elemtnts	20 NN Ass ChE
1	17	***2,1***	***0,91***	*50,49*	0,31	0,3	0,07	**0,37**	**43,3**	**0,42**	0,02	***0,76***	**0,25**		0,02		***0,7***	***SiAlPOSTiMgV***	6
2	16	**0,85**	**0,27**	*47,13*	0,24	0,27	**0,6**	**0,46**	***48,83***	**1,2**	0,02					***0,14***		***SiAlZnPOSCl***	5
3	1	**0,92**	**0,18**	69,08	0,66	***0,71***	***0,86***	***0,7***	25,24	***1,51***	0,02		0,14					***SiAlCaZnPS***	4
4	4	**1,44**	**0,45**	65,57	1,06	0,35	0,02	0,14	30,63	0,19	0,02		0,17					***SiAl***	3
5	8	**1,2**	**0,19**	64,39	0,9	0,1	0,02	0,01	33,04	0,17	0,02							***SiAl***	3
6	9	**0,83**	**0,31**	69,78	0,93	0,11	0,02	0,05	27,85	0,14	0,02							***SiAl***	3
7	10	**0,99**	**0,32**	67,36	1,08	0,09	0,02	0,01	29,68	0,22	0,26							***SiAl***	3
8	2	0,61	0,15	64,82	1	0,12	0,27	0,01	32,86	0,17	0,02							ooo	2
9	3	0,62	0,16	65,44	0,96	0,2	0,07	0,14	32,3	0,06	0,02			0,05				ooo	2
10	5	0,51	0,12	64,86	1,2	0,09	0,24	0,04	32,85	0,05	0,02		0,04					ooo	2
11	7	0,49	0,14	69,33	1,06	0,12	0,02	0,01	28,49	0,17	0,02		0,15		0,03			ooo	2
12	13	0,36	0,08	72,73	1,12	0,02	0,24	0,01	25,3	0,12	0,03							ooo	2
13	14	0,67	0,08	62,87	0,83	0,03	0,07	0,17	35,18	0,06	0,04							ooo	2
14	15	0,68	0,04	60,67	0,91	0,14	0,19	0,01	37,34	0,05	0,03							ooo	2
15	18	0,29	0,1	68,23	1,07	0,14	0,03	0,07	29,86	0,05	0,16							ooo	2
16	6	0,47	0,14	**82,47**	0,82	0,1	0,1	0,05	14,92	0,15	***0,28***		***0,28***		***0,22***			***FeCuMgNi***	1
17	11	0,6	0,12	***86,36***	0,67	0,06	0,02	0,01	11,89	0,13	0,02				**0,17**			***FeNi***	1
18	12	0,53	0,05	**85,82**	0,84	0,25	0,02	0,08	12,33	0,15	0,02							***Fe***	1

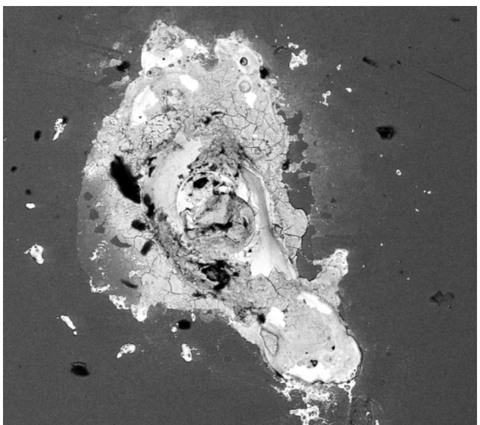
***Таблица 30.* Results of electron microprobe analysis of 18 samples melt chelyabinskites for greenhouse glass plot Jasmine (coal coated; carbon content is not determined).** *Content of chemical elements are given in the masses. %. Bold italic bold maximum and sharply increased contents of elements. All samples are organized by associations of the chemical elements ranging from strongly ferrous (1), standard (2) and silicate-ferrous (3) to abnormal associations (4, 5, 6).*

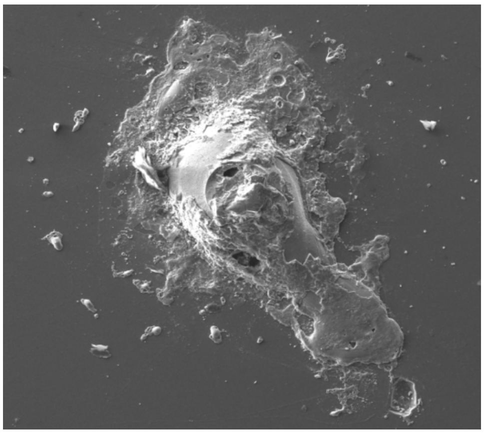
Результаты микрозондового анализа 18 проб расплавных челябинскитов для тепличных стекол участка Жасмин (угольное напыление; содержание углерода не определялось). *Содержания химических элементов даны в масс. %. Жирным курсивным шрифтом выделены максимальные и резко повышенные содержания элементов. Все пробы упорядочены по ассоциациям химических элементов, начиная от сильно железистых (1), стандартных (2) и силикатно-железистых (3) и заканчивая аномальными ассоциациями (4, 5, 6).*

1 *- data correlation and factor analysis, the major trend changes in the composition of chelyabinskites third type is the degree of oxidation of these formations, as determined by natural reduction of Fe from 86% to 46% and increased concentrations of oxygen from 12 to 49%;* ***2*** *- for associations chemical elements are three large groups of samples:* ***a*** *- fortified with Fe (**Табл.30, lines 16-18**);* ***b*** *- ordinary background samples, sometimes slightly enriched Si, Al (**Табл.30, line 4-15**);* ***c*** *- an abnormal sample sharply enriched Si, Al, and many other elements;* ***3*** *- all abnormal samples are characterized by a close range of the concentration with the anomalous contents of elements(Ca, Zn, P, O, S, Ni, Mg, Cl, V); here stands somewhat apart ache-6, which could suggest a connection with oil paragenesis. We emphasize again that in the Laboratory-5 carbon content was not determined. However, his presence is felt not only by paragenesises of chemical elements, but also by the abundance of black separations in photos.*

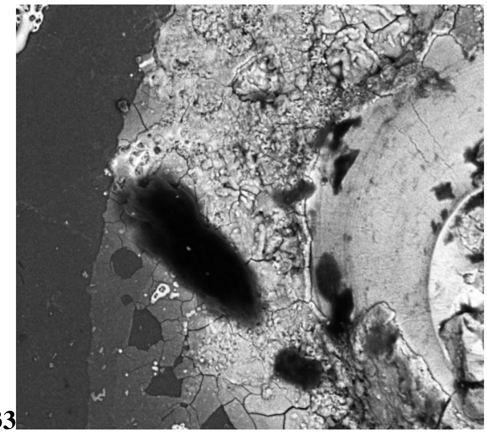
*In the **Laboratory-3** was studied 9 spots chelyabinskites on a glass plate with gold plating. This allowed evaluate possible level of carbon accumulation in the surveyed municipalities. Three spots from 9 shows the attached photos (**Foto-31-36**).*


31

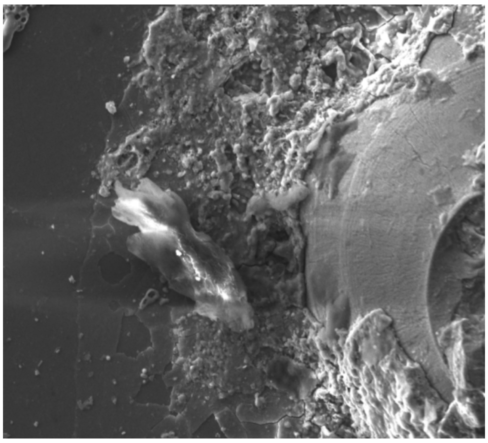

32



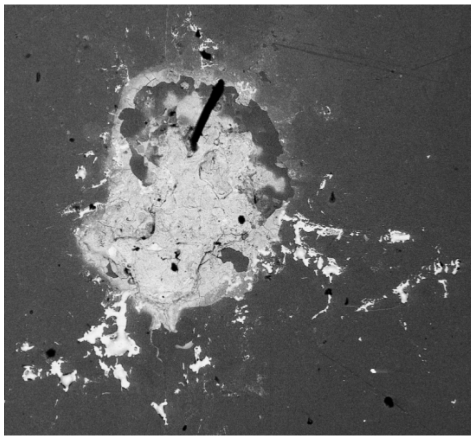
33



34



35



36

Фото – 31. *The image in the reflected electrons field of view - 2500x2500 MK. This is the largest spot melt chelyabinskites with the governing structures of smaller spots. In the center of spots numerous isometric black spots significantly carbon tumors.*
Изображение в отраженных электронах; поле зрения – 2500x2500 мк. Это наиболее крупное пятно расплавных челябинскитов с директивными структурами более мелких пятен. В центре пятна – многочисленные изометричные черные пятнышки существенно углеродистых новообразований.

Фото – 32. *The image in the reflected electrons field of view - 800x900 MK. For comparison, pictures, reflecting the peculiarities of composition (photo 32) and structure (photo 33) spots melt chelyabinskites, with major emitting carbon-glandular phase in the left top of the spot.*
Изображение в отраженных электронах; поле зрения – 800x900 мк. Для сравнения приведены фотографии, отражающие особенности состава (фото-32) и структуры (фото-33) пятна расплавного челябинскита, с крупным выделением углеродисто-железистой фазы в левой верхней части пятна.

Фото – 33. *The image in the secondary electrons; field of view - 800x900 MK. For comparison, pictures, reflecting the peculiarities of composition (photo 32) and structure (photo 33) spots melt chelyabinskites, with major emitting carbon-glandular phase in the left top of the spot.*
Изображение во вторичных электронах; поле зрения – 800x900 мк. Для сравнения приведены фотографии, отражающие особенности состава (фото-32) и структуры (фото-33) пятна расплавного челябинскита, с крупным выделением углеродисто-железистой фазы в левой верхней части пятна.

Фото – 34. *The image in the reflected electrons field of view - 250x280 MK. Photos (34 and 35) shows a fragment of spots chelyabinskites (photo-32 and 33) with major emitting carbon-glandular phase. Accordingly visible features of composition (photo 34) and structure (photo-35) this species chelyabinskites.*
Изображение в отраженных электронах; поле зрения – 250x280 мк. На фотографиях (34 и 35) представлен фрагмент пятна челябинскитов (фото-32 и 33) с крупным выделением углеродисто-железистой фазы. Соответственно видны особенности состава (фото-34) и структуры (фото-35) этой разновидности челябинскита.

Фото – 35. *The image in the reflected electrons field of view - 250x280 MK. Photos (34 and 35) shows a fragment of spots chelyabinskites (photo-32 and 33) with major emitting carbon-glandular phase. Accordingly visible features of composition (photo 34) and structure (photo-35) this species chelyabinskites.*
Изображение во вторичных электронах; поле зрения – 250x280 мк. На фотографиях (34 и 35) представлен фрагмент пятна челябинскитов (фото-32 и 33) с крупным выделением углеродисто-железистой фазы. Соответственно видны особенности состава (фото-34) и структуры (фото-35) этой разновидности челябинскита.

Фото – 36. *The image in the reflected electrons field of view - 1600x1600 MK. Spot melt chelyabinskites with perfectly expressed the staging of an. Products early stage are presented bright secretions Fe+FeO, while later dropstones FeO characterized by a darker tint. Recent gradually pass in the darkest difference composition Fe2O3. The final stage is fixed black swept separation carbon-ferrous composition with abundant easily volatile chemical elements.*
Изображение в отраженных электронах; поле зрения – 1600x1600 мк. Пятно расплавных челябинскитов с прекрасно выраженной стадийностью. Продукты ранней стадии представлены яркими выделениями Fe+FeO, в то время как более поздние натечные образования FeO характеризуются более темным тоном. Последние постепенно переходят в наиболее темные разности состава Fe2O3. Заключительная стадия фиксируется черным стреловидным обособлением углеродисто-железистого состава с обильными легко летучими химическими элементами.

*The largest grain chelyabinskites with a diameter of more than 2.5 mm (**Foto 31**) is complex ensemble various largest spots with Directive structure, with small their twists and perfectly expressed zoning. Bright areas of the native iron form a peripheral dotted lane or gray spots Iotsit-composition distributed almost equally. In the Central zone is dominated by numerous* *carbon-ferrous chelyabinskites, as black isometric in the context of the jets of the extruding from the main body. Close ratios are installed and in another spot melt chelyabinskites with perfectly expressed the staging of an (**Foto-36**). Products early stage are presented bright secretions Fe+FeO, while later dropstones FeO characterized by a darker tint. Recent gradually pass in the darkest difference composition Fe_2O_3. The final stage is fixed black swept separation carbon-ferrous composition with abundant easily volatile chemical elements. The greatest interest is in the **Grain-7**, thoroughly studied us and photographed as in the General form (**Foto-32** in the reflected electrons and **Foto-33** in secondary electrons), and in the form of a fragment (**Foto-34 and Foto-35**). In it on the background of significantly ferrous chelyabinskites acts lenticular body size 40*100 MK, folded high carbon formations.*

*The results of electron microprobe analyses (**Table 40, line 1-20**), made to all varieties chelyabinskites third type, clearly show that the identified data of the Laboratory-5 trend change ache persists and in the examined samples. From the first geochemical type (Fe, Mn) to the fifth (C, O, P, S, Cl, K) there is a change of metallic iron and its oxides on organo-mineral compounds. Presence in one of the samples of **nitrogen** reinforces the conclusion that chelyabinskites of the third type were formed in the air.*

*Unexpected findings were studying the greenhouse glass, host melt facies chelyabinskites (**Table 40, line 21-37; Foto-37-39**). It appeared that when any change process glasses happens removal of (Na, Si, Ca) and introduction (C, O, Fe). **Foto-38 and 39** illustrate the nature of micro-progress as a result of bomb blast from Chelyabinsk meteorite.*

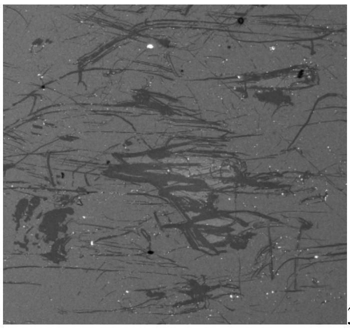
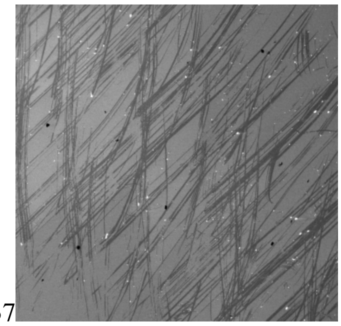
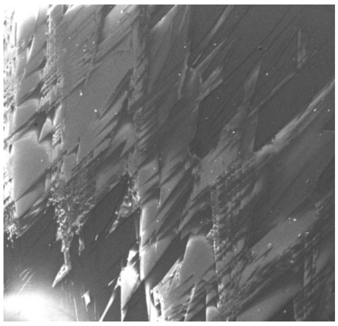

37

38

39

Фото – 37. *The image in the reflected electrons field of view - 1200x1200 MK. A typical picture of the distribution of areas of the modified greenhouse glass (dark gray) among unchanged (lighter monotonous gray).*
*И*зображение в отраженных электронах; поле зрения – 1200х1200 мк. Типичная картина распределения участков измененного тепличного стекла (темно-серый цвет) среди неизмененного (более светлый монотонный серый цвет).

Фото – 38. *The image in the reflected electrons field of view - 2400x2600 MK. A changed and deformed greenhouse glass with perfectly expressed plots strips strong changes (dark grey color on the photo-38) and with textured areas micro-tectonic shifts (photo-39).*
Изображение в отраженных электронах; поле зрения – 2400х2600 мк. Измененное и деформированное тепличное стекло с прекрасно выраженными участками-полосками сильных изменений (темно-серый цвет на фото-38) и с текстурными зонками микротектонических подвижек (фото-39).

Фото – 39. *The image in the secondary electrons; field of view - 2400x2600 MK. A changed and deformed greenhouse glass with perfectly expressed plots strips strong changes (dark grey color on the photo-38) and with textured areas micro-tectonic shifts (photo-39).*
Изображение во вторичных электронах; поле зрения – 2400х2600 мк. Измененное и деформированное тепличное стекло с прекрасно выраженными участками-полосками сильных изменений (темно-серый цвет на фото-38) и с текстурными зонками микротектонических одвижек (фото-39).

1 NN	2 Av N	3 Lab NN	4 GG	5 C	6 N	7 O	8 Na	9 Mg	10 Al	11 Si	12 P	13 S	14 Cl	15 K	16 Ca	17 Mn	18 Fe	19 Interpretation
1	19	131206,0702	1			6,32				3,69							89,99	1=Fe + FeO
2	3	131129,1203	1			10,35				0,66						1,38	87,61	1=Fe + FeO with Mn
3	30	131206,1402	2	3,28		13,39				1,37						1,37	80,17	2=FeO with C,Mn, Si
4	4	131129,1204	2			16,77				1,42						1,44	80,37	2=FeO with Mn, Si
5	5	131129,1205	2			15,79				1,54						1,60	81,08	2=FeO with Mn, Si
6	6	131129,1206	2			10,80				13,47					5,94	1,13	68,66	2=FeO with Si, Ca, Mn
7	11	131206,0203	2			23,15				0,83						1,21	74,49	2=FeO with Mn, Si
8	22	131206,0706	3	5,15		16,24				1,40							76,78	3=FeO with C, Si
9	31	131206,1403	3	4,52		10,34			0,46	1,97	1,15						81,80	3=FeO with C, P
10	37	131206,2304	3	5,05		18,97				0,86							75,12	3=FeO with C
11	2	131129,1202	3			15,68	0,97	0,80		1,32							81,22	3=FeO
12	25	131206,0903	3			21,97				0,97							77,06	3=FeO
13	20	131206,0703	4	6,27		29,78				1,15							62,80	4=Fe2O3 with C, Si
14	21	131206,0704	4	9,50		24,91				0,91	1,57	1,82					60,94	4=Fe2O3 with C, S, P
15	26	131206,1101	4	5,97		25,01				1,99							67,03	4=Fe2O3 with C, Si
16	10	131206,0202	4			44,77	1,08		1,17	2,42	1,63				0,87		47,90	4=Fe2O3 with Si, P, Al, Na
17	1	131129,1201	4			25,80	1,30	0,67		1,56							70,63	4=Fe2O3 with Si, Na
18	18	131206,0701	5	59,20	9,79	24,06	0,55			0,58	0,35	0,69	0,58	0,22			3,98	5=CON with S, Cl, Na
19	23	131206,0901	5	54,70		22,12	1,22			2,01	0,51	0,65	1,33	0,70			16,76	5=COSi with Cl, Na, K, S, P
20	24	131206,0902	5	46,90		15,47	1,14		0,19	2,60		0,88	0,91	0,45	1,13		30,17	5=COSi with Na, Ca, Cl, S
21	27	131206,1102	6	9,80		38,10	2,78	0,64	0,54	19,58	1,67				3,75		22,77	6=OSiFeC with Ca,Na,P
22	35	131206,2302	6	6,05		37,91	5,73	1,63	0,54	33,90					5,24		8,40	6=OSiFeC with Na, Ca, Mg
23	29	131206,1104	6	13,49		44,11	2,92	0,52		9,11							18,65	6=OSiFeC with Na
24	13	131206,0402	7			43,51	11,68	2,70		37,78					4,32			7=OSiNaCaMg
25	14	131206,0403	7			42,81	11,37	2,77		38,68					4,37			7=OSiNaCaMg
26	16	131206,0405	7			44,78	10,65	2,41	0,98	37,30					3,88			7=OSiNaCaMg with Al
27	33	131206,1702	7			45,69	10,31	2,98		36,96					4,06			7=OSiNaCaMg
28	17	131206,0406	7			41,27	9,03	2,47	1,06	40,41					5,16			7=OSiNaCaMg with Al
29	7	131206,0001	8			37,59	9,26	2,17		43,98					7,00			8=SiONaCaMg
30	8	131206,0002	8			37,36	8,85	2,33		43,27					5,98		1,67	8=SiONaCaMg with Fe
31	9	131206,0201	8			36,72	9,33	2,72		44,82					6,39			8=SiONaCaMg
32	12	131206,0401	8			35,10	9,57	2,03		45,66					7,64			8=SiONaCaMg
33	15	131206,0404	8			38,27	9,79	2,57	1,11	42,97					5,29			8=SiONaCaMg with Al
34	28	131206,1103	8			35,85	9,06	2,57	0,90	45,07					6,58			8=SiONaCaMg with Al
35	32	131206,1701	8			38,14	10,26	2,22	0,67	42,61					5,75			8=SiONaCaMg with Al
36	34	131206,2301	8			36,60	9,58	2,57		44,84					6,41			8=SiONaCaMg
37	36	131206,2303	8			31,36	10,41	2,50		47,01					8,72			8=SiONaCaMg
38		n=2	**1**			**8,34**				**2,18**						1,38	**88,80**	Fe + FeO
39		n=5	**2**	*3,28*		**15,98**				**3,73**					*5,94*	**1,35**	**76,95**	FeO with Mn
40		n=5	**3**	4,91		**16,64**	*0,97*	*0,80*	*0,46*	**1,30**	*1,15*						**78,40**	FeO
41		n=5	**4**	7,25		**30,05**	*1,19*	*0,67*	*1,17*	**1,61**	*1,60*	*1,82*			*0,87*		**61,86**	Fe2O3 with C, Si
42		n=3	**5**	**53,60**	*9,79*	**20,55**	**0,97**		*0,19*	**1,73**	0,43	**0,74**	**0,94**	**0,46**	*1,13*		**16,97**	органо-минер.соединения
43		n=3	**6**	**9,78**		**40,04**	**3,81**	**0,93**	0,54	**20,86**	*1,67*				4,50		**16,61**	стекло с Fe+C
44		n=5	**7**			**43,61**	**10,61**	**2,67**	*1,02*	**38,23**					**4,36**			стекло измененное
45		n=9	**8**			**36,33**	**9,57**	**2,41**	*0,89*	**44,47**					**6,64**		*1,67*	стекло неизмененное
46		All GG		17,68	*9,79*	**28,56**	6,82	*2,07*	*0,76*	**18,83**	*1,15*	1,01	**0,94**	**0,46**	5,18	*1,36*	**56,92**	

***Таблица – 40.* Results of electron microprobe analysis 37 samples of melt chelyabinskites and greenhouse glass plot Jasmine (gold plating TPTS=transparent-polished thin section; the estimated carbon content was determined in all the samples).** *Content of chemical elements are given in the masses. %. All samples are sorted by numbers 8 geochemical aggregates (GG). In the bottom part of the table the interpretation of geochemical sets and shows the average values for all elements. Here in bold are meaningful values, standard type - inferred (indicate the maximum possible threshold), italics - approximate value of the maximum threshold.*

Результаты микрозондового анализа 37 проб расплавных челябинскитов и тепличных стекол участка Жасмин (золотое напыление ППШ; ориентировочное содержание углерода определялось во всех пробах). *Содержания химических элементов даны в масс. %. Все пробы упорядочены по номерам 8 геохимических совокупностей (**GG**). В нижней части таблицы дана интерпретация геохимических совокупностей и приведены средние значения для всех элементов. Здесь **жирным** шрифтом выделены достоверные значения, **стандартным** шрифтом – предполагаемые (указан максимальный возможный порог), **курсивом** – ориентировочное значение максимального порога.*

Discussion of the results

Comparative analysis of chelyabinskites of different types. *The most contrasting differences between chelyabinskites 1, 2, 3 types are set according to **Morphological** characteristics. Individuality **Chelyabinskites Spherulas facies -** Microspherulas, with numerous subtypes, different degree of openness of the system, suggests that chelyabinskites of the first type are not the product of a melting world ChM. Spherules described V.Celmovich as «space* *balls» are smaller in size (up to 20 microns) and differ from chelyabinskites magnetite composition. **Chelyabinskites Ash facies** is studied obviously not enough; however, even now one can say that the plot Jasmine will prevail chelyabinskites three varieties – Gas-saturated Air-Fluidolites (final stage in the development microspherulas chelyabinskites first type), ash education and lithosphere debris (granite, gneiss and crystalline schists), ash ferrous micro-breccia (possibly mantle origin). It is not excluded that in the future be able to find the wreckage of the world ChM (however, find it hard to believe). **Chelyabinskites Melt facies** a unique phenomenon. We are still studied 12 records size 24*40 mm and 2 large glass is about 15 cm in diameter (more than 1000 melt spots). According to the materials of morphological analysis allocated about 10 varieties «melt spots»; no doubt they will vary according to chemical composition. But this is a task for further research.*

Composition of chelyabinskites *vary widely. However, all three morphological type of these formations combine to 3 main criteria: **1 - time** education; it is limited at intervals of not more than 30 seconds, and due to the decline in world ChM on February 15, 2013; **2** - significantly **Fe-content** chelyabinskites tumors and the presence of native Fe, wustite and Maghemite (?), with all the possibilities of gradual transitions between them in the form of mineral mixtures and glasses (?); **3** - in the final stages of education of all chelyabinskites formed **gas-saturated carbon derivatives**, enriched Si, Al, CA, P, S, Cl and other elements. The most important factor governing the distribution of chemical elements in specific chelyabinskites beans is the redox conditions; it is possible to allocate geochemical types of chelyabinskites.*

***Zoning Microspherulas** of chelyabinskites studied insufficiently. Set distribution of the native iron to the Central zones. The development of liquation processes at crystallization. There are many cracks and canals, which of **spherules** with the explosion of eruptions produced concluding portion Air-Fluidolites.*

Minerals, *associating with microspherulas and Chelyabinskites Ash facies can be good indicators of the conditions of education Chelyabinskites. Discovered in **Spherulas-6** mineral **Native Silicon** indicates sharply reducing conditions of education. Finding Schreibersite (?) grain unknown mineral, presumably **carbon analogue Schreibersite,** gives hope for discovery and other grains rare minerals. We assume a high probability of finding **Moissanite** and its modifications, by analogy with the Tunguska phenomenon of **shungite** and numerous mineral indicators fires Chelyabinsk coal (http://www.dissercat.com/content/mineraloobrazovanie-v-protsessakh-pirogennogo-metamorfizma). It is quite obvious that their detection can be explained by the meteorite hypothesis.*

Genetic models. *If not to take into account «melt-komar hypothesis» education of melt spots on the window glass of Chelyabinsk University, it is suggested three models of formation Chelyabinskites – meteorite, crypto-volcanic and UFO-geological.*

***Meteorite hypothesis** has already proved its right to exist (work V.Celmovich with co-authors). However, here it is necessary to conduct additional research. First of all, in the area mapping of habitats microspherulas will need to allocate plots distribution Microspherulas of chelyabinskites, will have to develop clear criteria for distinction meteorite and not a meteorite tumors. Meteorite model can be productive while studying Chelyabinskites Ash facies. However, to melt spots this model is not likely to be used.*

***Crypto-volcanic model** developed by G.Skublov and co-authors for Kirishi and the Tunguska phenomena (http://www.hodka.net/sb2012.pdf - page 172-209), may be helpful in studying the rocks Ash facies. Among them may be analogues not until the end of us studied the unique fragments of rocks and minerals from the black differences Tunguska catastrophe trees exposed to radiant burn. You can also assume that only part of the Chelyabinsk microspherulas be associated with UFO-activity; most of them by analogy with volkhovites (http://www.hodka.net/labazskub.php) presumably formed when the cavitation processes.*

UFO-geological hypothesis** assumes active participation of lithospheric UFO-plasmoids in the fate of the Chelyabinsk meteorite. This hypothesis has not yet popular among geologists,* *despite the convincing arguments of ufologists (http://wands-of-horus.com/ru/iicufi/meteors/86-cheliabinsk-metheorite.html), scientists (http://sobesednik.ru/incident/20130211-letchik-ispytatel-marina-popovich-inoplanetyane-uzhe-prileteli) and popularizers of the idea of the presence of UFOs on Moon (http://www.youtube.com/watch?v=i3pGd7BlpvM). Moreover, in the official document of RAS (http://www.biophys.ru/archive/bulletin/vzn_11_p22.pdf) these «seditious ideas» are declared pseudoscience. G. Skublov for the second year is actively engaged in this problem, making it more 43 thousand photos open Siversky, Leningrad and Okhta phenomena (https://www.facebook.com/skublov/media_set?set=a.533055620096708.1073741905.100001768237075&type=3) published on Facebook dozens of UFO photo albums. In the published* ***GTS *series of articles about paradoxes* ***ChM*** *(http://www.hodka.net/DOC221.PDF) focus on this issue. However, at this stage studies require stronger evidence of the reality of the existence of numerous lithospheric UFO-plasmoids. We all know that in 99% of cases they are not visible and that their presence is securely installed only with night photography on modern photo-cameras with flash lamp.*

The basis of our UFO-geological hypothesis assumption ***that a lithospheric UFO-plasmoids are not biogenic representatives of the hydrogen-phosphoric life and that their deaths can be formed microspherulas with high contents of various chemical elements.*** *The authors of the idea are aware of the fact that most of the researchers of this phrase may sound «ravings of a madman». We agree with the majority, if we get a sensible answer to the question - why is the 40-year pause humanity in the failure to carry out the Moon ?*

Thus, let us not reject ***UFO-geological hypothesis*** *Chelyabinsk phenomenon and try to find evidence of participation UFO-plasmoids in the fate of the world ChM. At this point in your study chelyabinskites can restrict the idea of many-hypotheses equal chances these formations and consider the hypothesis discussed as equal chances.*

Conclusion

Let us formulate the main results of the study.

1. Chelyabinskites - a new type of natural formations. *February 15, 2013. the fall and the outbreak of Chelyabinsk meteorite within a maximum of one minute formed unusual significantly ferrous and silicate-glandular growths, which are described by us as Chelyabinskites type 1 (**microspherulas**), type 2 (**ash facies**) and type 3 (**melt education**). They sharply differ by morphological features, but reveal the surprising similarities in composition. Chelyabinskites 1 and 3 types found within, Chelyabinsk, in the area of seismo-tectonic activity in the explosion of world **ChM**, and has not yet met on the sections of the findings of numerous fragments of Chelyabinsk meteorite.*

2. Microspherulas - Chelyabinskites 1 type. *Presented by black and reddish-brown **microspherulas** size from 50 to 800 microns (average – 100, maximum 4500 microns). There are 4 subtype - closed hollow; semi u-open with emptiness; open with traces of emission; open with of the gas-saturated Aero-fluidolites. Marked by numerous xenogenic fragments of granite, gneiss and minerals. Composition microspherulas varies from native iron to wustite (?) and oxide Fe. In gas-saturated spherulas are set higher concentration of C, P, S, Cl, and other items. In cavity one of spherulas greeted with a grain of Native Silicon.*

3. Ash facies - Chelyabinskites 2 type. *Presented fragments of irregular shape of black color in the size from 100 up to 700 microns. There are three subtypes - Aero-fluidolites mixed with products explosive faction microspherulas (a); massive fluidolites with traces of* *current and differentiated by the degree of saturation of carbon and oxygen (b); micro-breccia fluidolites with fragments of native Fe and other minerals (c). For breeds Ash facies is characterized by a considerable role silicate-secreting tumors and high content of volatile chemical elements.*

4. Melt facies - Chelyabinskites 3 type*. While found in only one plot in the city of Chelyabinsk. Here on the glass of a greenhouse reported numerous melt spot size from 100 to 2500 microns (average 700 microns). The form of their extremely diverse - ring, linear, spotted, undulated, spheroidal and other penetration of the glass is 50 - 400 microns. Composition Chelyabinskites 3 types are divided into two subtypes - significantly ferrous and silicate-ferrous, with bubbles, voids, microspherulas, exsolution solid solutions etc. (a); C-enriched fluidolites with the maximum content of C, P, S, Cl, and the transitions in organo-mineral compounds (b). Greenhouse glass substantially change its structure under the influence of melt Chelyabinskites.*

5. Geochemical types Chelyabinskites. Association of chemical elements and minerals*. All three morphological type Chelyabinskites characterized unidirectional trend change restoration conditions oxidation in the process of their formation . This flag is taken as the basis for the allocation of their geochemical types: 1= Fe - native; 2= Fe+FeO - native and ferrous; 3= FeO - mainly ferrous; 4=Fe2O3 - mainly oxide; 5= Chelyabinskites silicate-ferrous; 6= Chelyabinskites silicate-ferrous enriched gas. In Chelyabinskites three of the Association of chemical elements: 1 - Fe, Mn, Ti, Ni, Cu; 2 - Si, Al, Ca, Na; 3 - C, P, S, Cl, N, K, Mg, V. Additional accompanying minerals predominate quartz, feldspar and mica of granites and gneisses of the crystalline basement. Rare minerals -* ***Native Silicon*** *and* ***carbon analogue Schreibersite (?).***

6. Genetic models Chelyabinskites*. The most probable models of formation Chelyabinskites can be considered meteorite, crypto-volcanic and UFO-geological. The authors put forward the thesis of poly-genetic education Chelyabinskites. Emphasizes that the UFO-geological model can be constructive in addressing the question of the origin of microspherulas and melt facies Chelyabinskites.*

7. The needs for further research*. It is necessary to carry out a comprehensive study of Chelyabinskites, including issues such as drafting the work program and the selection of a rational complex of methods of research, field observations, laboratory studies and methods of processing of the received data. Among the main theoretical issues should pay attention to the perceived us in the triad «Chelyabinskites - UFO - Cold nuclear synthesis». This problem, according to materials of the review (http://www.unconv-science.org/n1/parkhomov/) and theoretical article (http://liga-ivanovo.narod.ru/starov.htm), deserves special attention, as during the cold fusion formed UFO-plasmoids (http://forum.cnews.ru/lofiversion/index.php/t68570-5700.html), and the content of produced when material of Cold nuclear synthesis (http://podelise.ru:81/docs/13803/index-7277-1.html?page=3) almost completely corresponds to the composition of Chelyabinskites.*