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Title

Astrophysics at home. Further hunting for possible micrometeorites.

Abstract

This paper follows “Astrophysics at home. Micrometeorites” posted in Vixra on 15 Feb 2011.

As Jon Larsen says: “Up until now splendid research on MMs has been executed at secure localities (the South Pole well, prehistoric layers beneath the Indian Ocean, at the Greenland ice cap, etc), but consistent research in order to identify the similar objects found for instance in our populated areas, is practically absent”.

I present here a lot of new specimens found in a city environment, photos, a lot of questions and few answers.

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Introduction

As stated in [1] “Up until now splendid research on MMs has been executed at secure localities (the South Pole well, prehistoric layers beneath the Indian Ocean, at the Greenland ice cap, etc), but consistent research in order to identify the similar objects found for instance in our populated areas, is practically absent. Our goal is to do something about this”. See [1], [2].

Methods to collect micrometeorites

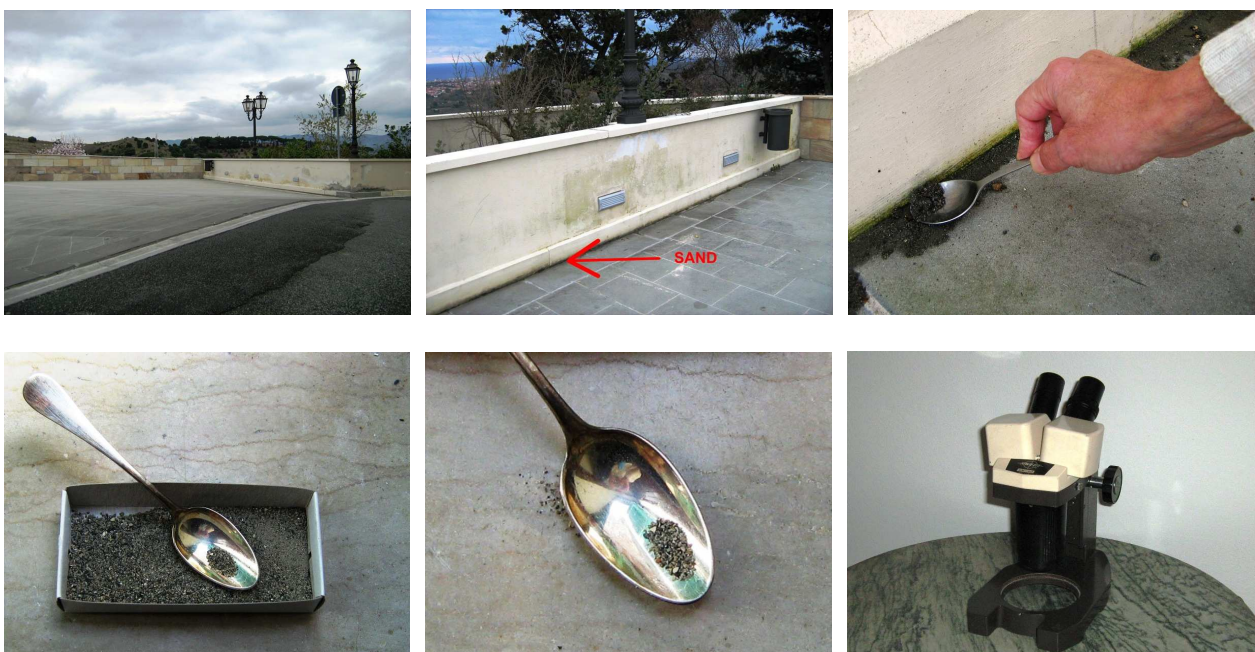
There are a lot of methods to collect micrometeorites [3].
For iron micrometeorites you may follow these instructions.

Use a small but strong magnet and cover it with a cellophane bag. Look (..... for example) at the floor drain under the gutter downspout. A copper or plastic gutter is recommended. Remove the floor drain cover. Sweep the covered magnet slowly through the water. Remove the magnet from its cover, and shake the cover on a white paper. Evaporate the water. Once evaporated, examine it with the microscope. Most of the particles you see will not be micrometeorites, but debris of terrestrial origin. If you are fortunate, you can see some metallic rounded object, which is likely to be a micrometeorite.

But working with a magnet your collection is limited to the small fraction of micrometeorites that have magnetic qualities. Since a good percentage of the micrometeorites are non iron, they would be missed by the magnetic method. So I decided to proceed with a different method: samples are collected by hand, then washed, cleaned and once evaporated they are examined step by step with a stereo microscope.

Many non iron specimen I've found with this new method, without a magnet, looking at the sand in sites like this: the sides of a wide terrace in Rosignano Marittimo.

Here below my method.



Findings

With a magnet I've found a lot of particles, mainly iron, like these



However collecting particles with my new method I've found a lot of spherules which look differently, like these



These findings put to me a series of questions.

On the Internet there is a lack of optical images.

This opens a problem about the morphology of these objects: *what do micrometeorites actually look like?*

As a matter of fact you can find on the Internet a lot of SEM images, but practically no photos.

A further curiosity is this.

Up until now splendid research on MMs has been executed at secure localities (the South Pole well, prehistoric layers beneath the Indian Ocean, at the Greenland ice cap, etc).

Consistent research in order to identify similar objects found in populated areas is practically absent. Why?

Apparently the reason is that in populated areas it's too difficult to separate the extraterrestrial objects from objects of terrestrial provenance. But in my opinion this is not a good scientific reason.

Classification

I present here a rough classification, I admit no more than aesthetic.

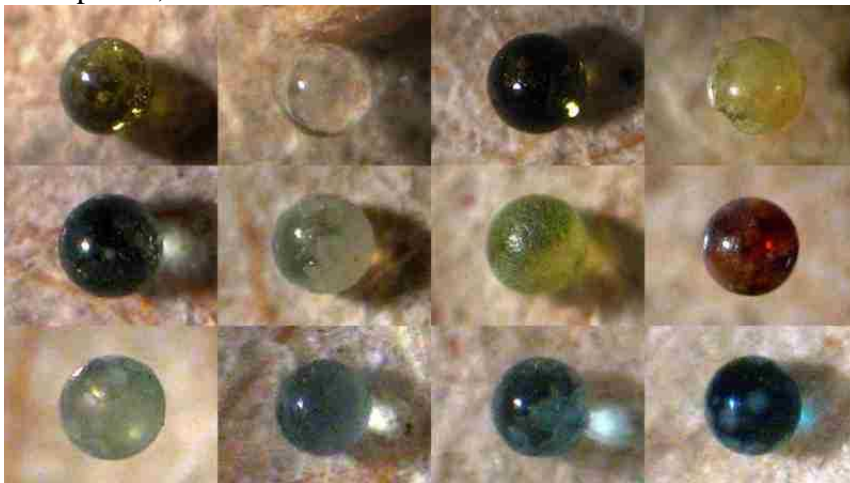
Iron specimens



Speckled



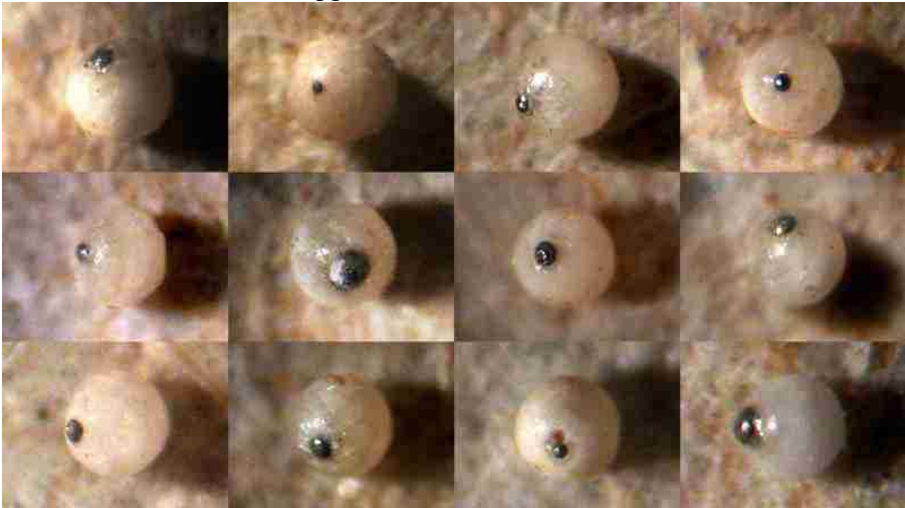
Transparent, various colors



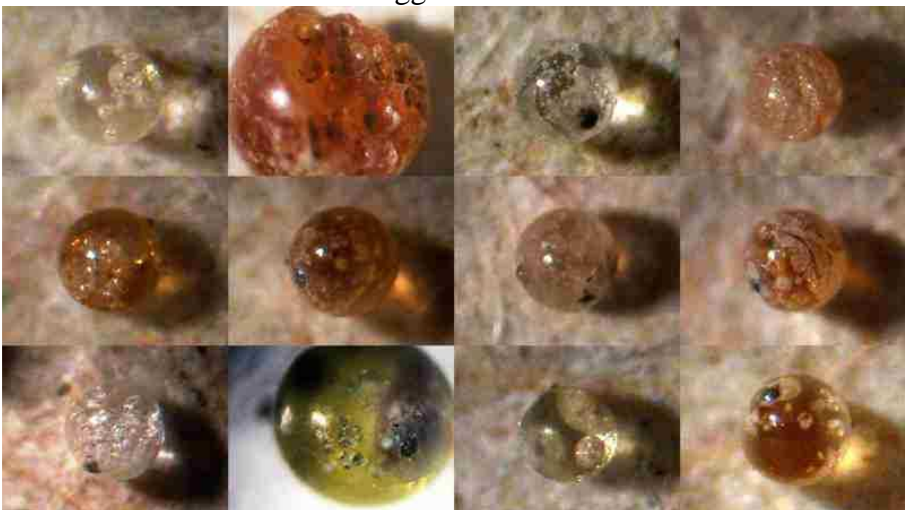
Green / light blue



White / with metallic nugget



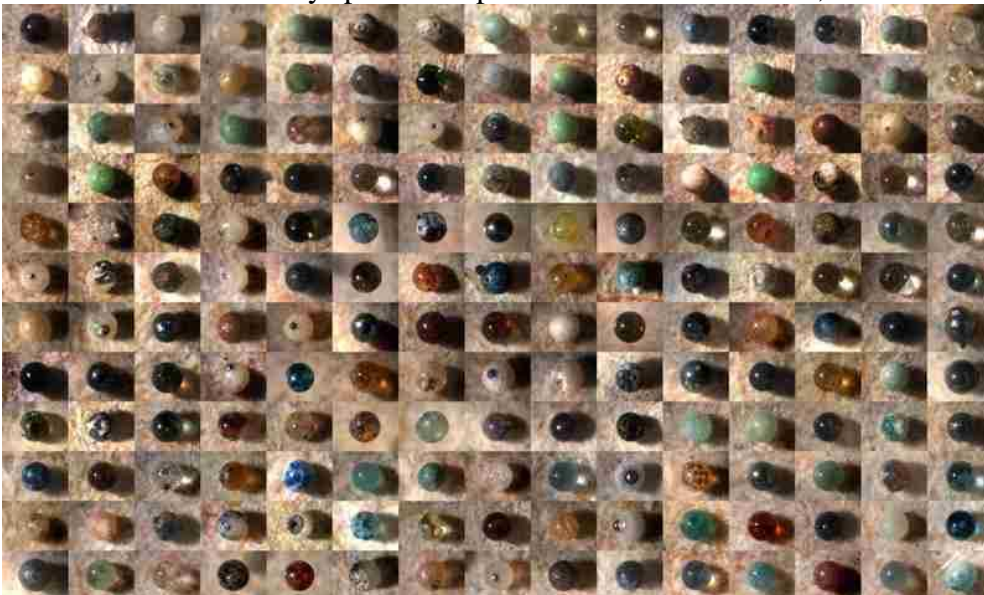
Internal vesicles & metallic nugget



Possible micro-tektites. Size 0,5 – 3 mm. Look like volkhovites [6].



...and the overall of my spherules updated march 2011. Size 0,5 – 2 mm.



Note: all specimens were collected Feb. 2011 in these two terraces in Rosignano Marittimo, two very good sites. Other sites: nothing at all.



Other photos of possible micrometeorites in [4], [5].

Observations

1 - Age of sites.

The construction of the two terraces dates back 2 years.

So I can suppose an accumulation time of 2 years (never swept, I think).

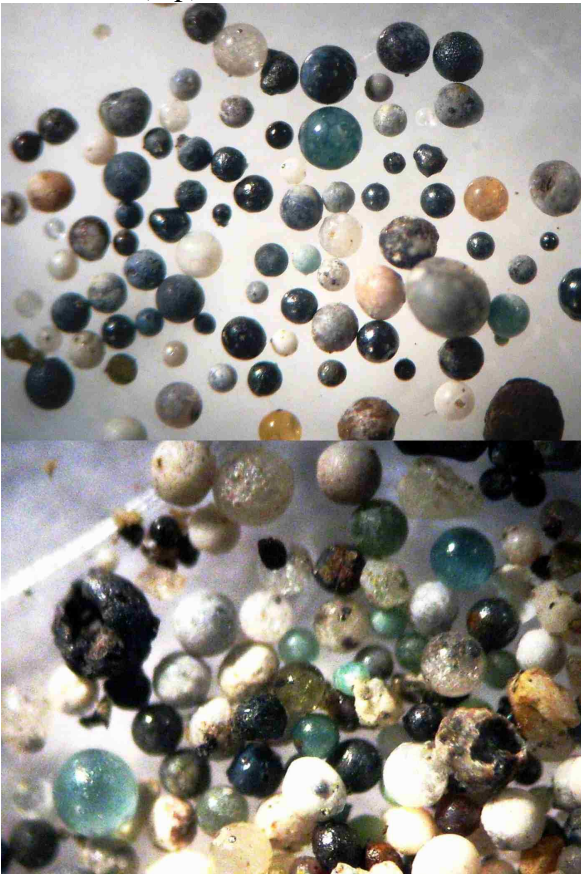
It must be noted that 1 month later we checked the same sites for other specimens: we have found new sand, but no spherules at all.

2 - Comparison with Montenero, 20 km north.

After a long research we have found specimens in Montenero, 20 km away. Here photo of the site



Specimens here (bottom, Silvana Cosmi's collection) look very similar to those in Rosignano Marittimo (top)



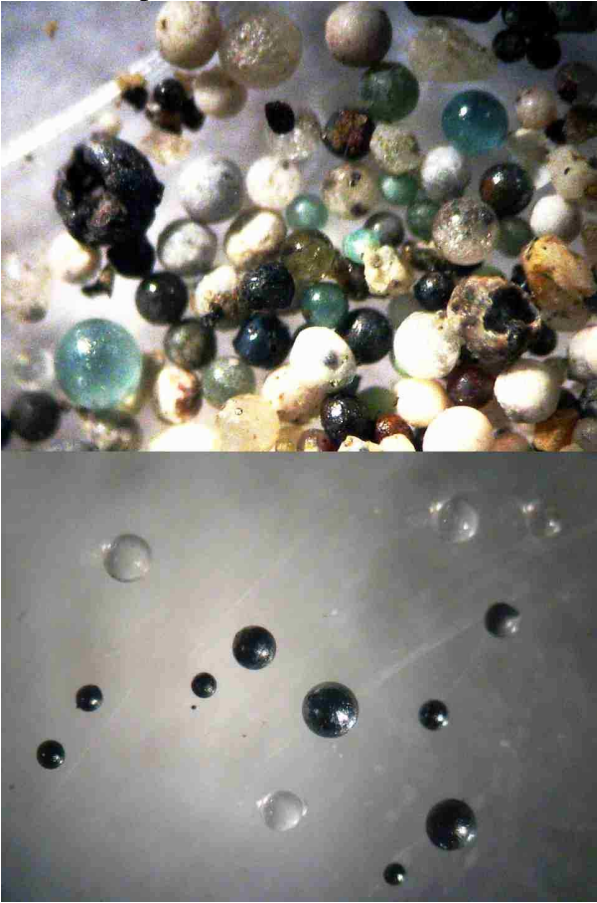
3 - Redistribution of samples by rain and wind.

In the same place, only 5 meter away, we found spherules exclusively of this kind:

A – metallic;

B - transparent, vitreous.

See here a photo of the difference



In my opinion this is probably due to a strong redistribution of spherules by rain and wind caused by her size, specific gravity etc.

Micrometeorites or Micrometeorwrongs?

The human industrial activity can be considered as the source of spherical particles that were often confused as micrometeorites.

The challenge is to separate the extraterrestrial objects from objects of terrestrial provenance.

A problem is that very little is known, so far, about the morphology of these objects - what do micrometeorites actually look like? Also: *“what do false micrometeorites actually look like?”*

My goal would be to create a list of false micrometeorites and/or cosmic spherules in order to discriminate between terrestrial and extraterrestrial origin.

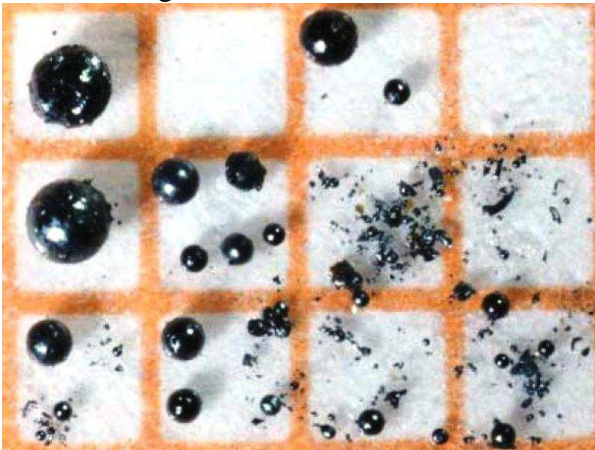
I repeat, I think that it is interesting and probably not totally irrelevant to reverse the question about the morphology: *“what do false micrometeorites actually look like?”*.

I present a first tentative list of possible micrometeorwrongs, to be further analyzed.

Iron spherules from grinding wheel treatment

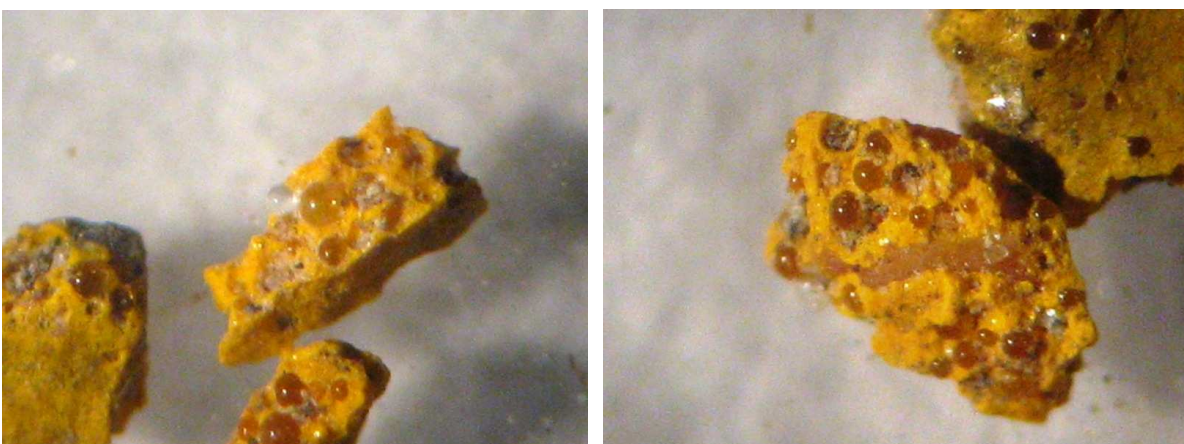
Iron “false micrometeorites” can be produced for ex. by grinding wheel treatment.

Here an image, from [7].



Glass spherules from composite materials

My friend Silvana Cosmi collected a kind of composite material with many glass spherules [8].



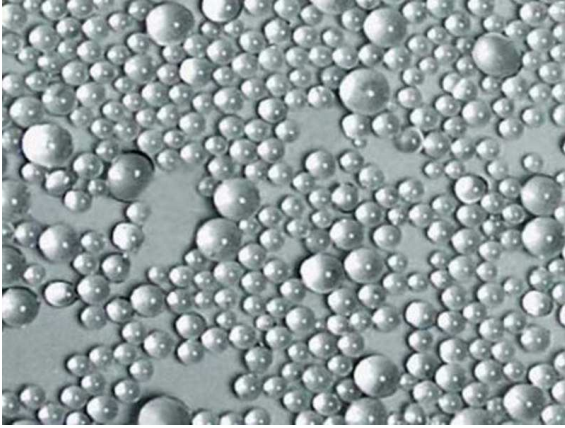
This material was collected near a big store and also in a parking.

However these glass spherules look differently from (possible) micrometeorites because they seem to have:

- always max. size 0,3 - 0,4 mm;
- always no vesicles;
- always no metal bead.

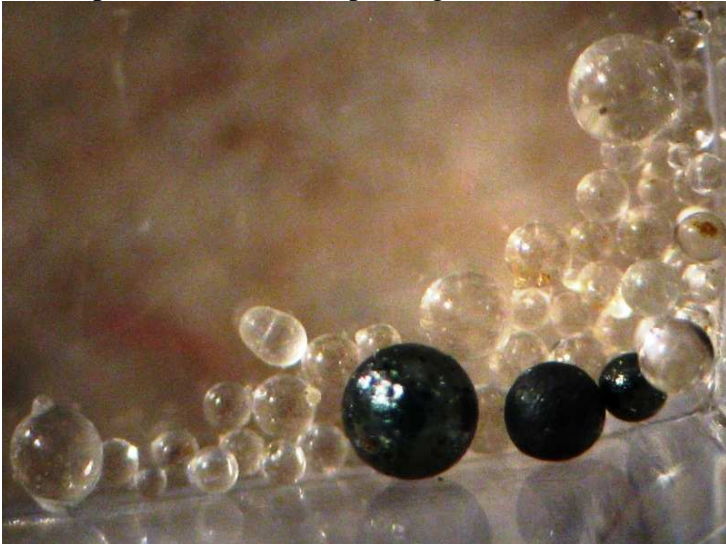
Glass spherules from reflective painting

Paint with reflective beads has been found very useful for pavement marking. The retroreflectivity of glass beads is explained by examining the path of light as it enters a single bead in the paint: as the headlight beam enters the bead, it is bent or refracted downward. Here an image of glass beads for road marking paint (from Google Images).



Collecting spherules in a car parking in Montenero I've found only a few metallic spherules, and many transparent glass spherules.

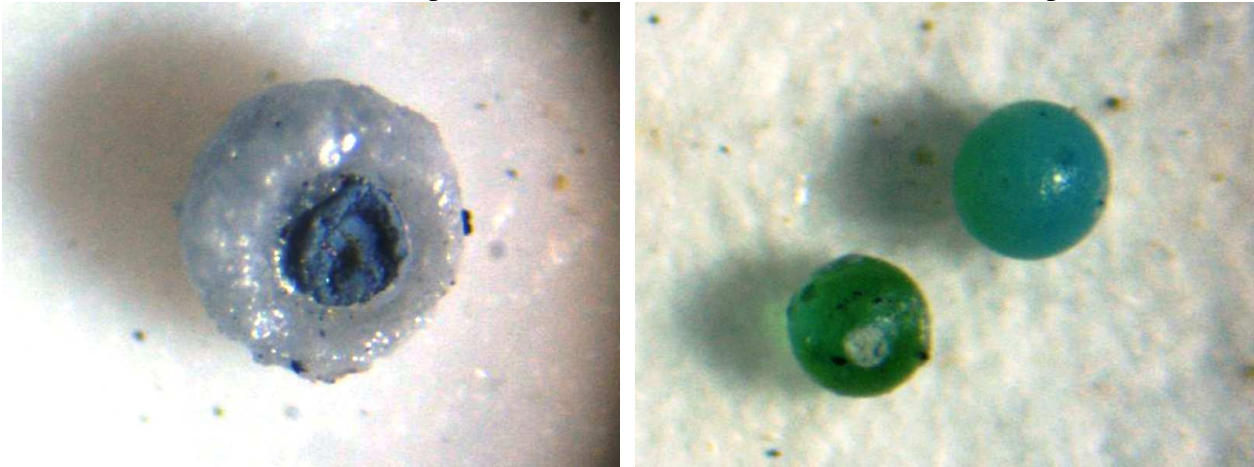
Glass spherules from a car parking



Perhaps these are due to reflective painting?

Glass spherules from fireworks

Silvana Cosmi [8] has collected spherules like these in a terrace (Tirano, Sondrio province).



There was a launch of fireworks from this terrace, so the origin of these spherules is quite suspect. So probably also some specimens from Rosignano Marittimo may be due to the traditional midnight launch of fireworks to celebrate the arrival of the new year.

Conclusion

In order to collect MMs in our urban areas the challenge is to separate the extraterrestrial objects from objects of terrestrial provenance.

I've presented here a lot of specimens found in Italy, and I've discussed some open issues.

References

[1] Group, project.stardust@groups.facebook.com

[2] Community, <http://www.facebook.com/pages/Project-Stardust-Jon-Larsen/196022003753026?sk=wall>

[3] Link: <http://bizarrelabs.com/met.htm>

[4] J. Larsen – Foto – Micrometeorites, www.myspace.com/jonlarsenguitar/photos/51836900

[5] Link: www.micrometeorites.weebly.com

[6] G.T. Skublov et al., "Volkhovite: a new type of tektite-like glass", *Geology of Ore Deposits* 49: 681-696, (2007)."

[7] A. Anselmo, "Observation of false spherical micrometeorites", <http://arxiv.org/ftp/arxiv/papers/0708/0708.4276.pdf>

[8] personal communication