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## Gold and Diamond-bearing astropipes of mongolia (Neologism and new scientific discovery)

**D. Dorjnamjaa, B. Enkhbaatar, G. Altanshagai**  
Mongolian Academy of Sciences, Mongolia

In this paper we present summation of eighteen year's investigation of the all gold and diamond-bearing astropipes of Mongolia. Four astropipe structures are exemplified by the Agit Khangay (10 km in diameter, 470 38' N; 960 05' E), Khuree Mandal (D=11 km; 460 28' N; 980 25' E), Bayan Khuree (D=1 km; 440 06' N; 1090 36' E), and Tsenkher (D=7 km; 980 21' N; 430 36' E) astropipes of Mongolia. Detailed geological and gas-geochemical investigation of the astropipe structures show that diamond genesis is an expression of collision of the lithospheric mantle with the explosion process initiated in an impact collapse meteor crater. The term "astropipes" (Dorjnamjaa et al., 2010, 2011) is a neologism and new scientific discovery in Earth science and these structures are unique in certain aspects. The Mongolian astropipes are genuine "meteorite crater" structures but they also contain kimberlite diamonds and gold. Suevite-like rocks from the astropipes contain such minerals, as olivine, coesite, moissanite (0,6 mm), stishovite, coesite, kamacite, tektite, khamaravaevite (mineral of meteorite titanic carbon), graphite-2H, khondrite, picroilmenite, pyrope, phlogopite, khangaite (tektite glass, 1,0-3,0 mm in size), etc. Most panned samples and hand specimens contain fine diamonds with octahedrol habit (0, 2-2,19 mm, 6,4 mg or 0,034-0,1 carat) and gold (0,1-5 g/t). Of special interest is the large amount of the black magnetic balls (0,05-5,0 mm) are characterized by high content of Ti, Fe, Co, Ni, Cu, Mn, Mg, Cd, Ga, Cl, Al, Si, K. Meanwhile, shatter cones (size approx. 1.0 m) which are known from many meteorite craters on the Earth as being typical of impact craters were first described by us Khuree Mandal and Tsenkher astropipe structures. All the described meteorite craters possess reliable topographic, geological, mineralogical, geochemical, and aerospace mapping data, also some geophysical and petrological features (especially shock metamorphism) have been found, all of which indicate that these structures are a proven new type of gold-diamond-bearing impact structure, termed here "astropipes". The essence of the phenomenon is mantle manifestation and plume of a combined nuclear-magma-palingenesis interaction.

ddorj2001@yahoo.com

## Hierarchical porous carbon nanostructures for energy storage

**Jian-Gan Wang**  
Northwestern Polytechnical University, China

Hierarchical porous carbon nanostructures offer a promising avenue to effectively address energy and environmental problems. In this talk, we would introduce two recent work regarding porous carbon nanotubes and nitrogen-doped ordered mesoporous carbon spheres. First, we developed a totally green synthesis route for fabricating hierarchically porous carbon nanotubes without the assistance of any soft/hard templates and activation procedures, thereby rendering the new synthesis route highly recyclable, eco-friendly, and scalable. The as-prepared porous carbon materials exhibit a high specific surface area of 1500 m<sup>2</sup> g<sup>-1</sup>. The porous carbon can be served as excellent electrode materials for high-performance supercapacitors, delivering a high specific capacitance of 281 F g<sup>-1</sup> at 0.1 A g<sup>-1</sup> along with outstanding rate and cyclic performance. In the second section, we will report a facile one-pot soft-templating and one-step pyrolysis method to fabricate nitrogen-doped ordered mesoporous carbon spheres (N-OMCS). The as-obtained N-OMCS possesses an average diameter of around 300 nm, a moderate specific surface area of 439 m<sup>2</sup> g<sup>-1</sup> and uniform mesopore size at 3.2 nm. Owing to the ordered meso-structure and nitrogen doping, the N-OMCS materials, when used as supercapacitor electrodes, delivers a high specific capacitance of 288 F g<sup>-1</sup> at a current density of 0.1 A g<sup>-1</sup>. More remarkably, the N-OMCS electrode shows excellent rate capability with 66% capacitance retention at an ultrahigh current density of 50 A g<sup>-1</sup> and outstanding cycling stability with almost no degradation over 25000 cycles. The two work would open up new avenues to synthesize highly porous carbon nanostructures with unique architecture and surface chemistry, such as hollow/meso structure and nitrogen doping for high efficient energy storage applications.

wangjiangan@nwpu.edu.cn