Harnessing Fullerenes-Shungite in Mangampet Barytes Mines, India for the overall benefit of Andhra Pradesh

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The element Carbon occurs in six polymorphs as shown in Fig. 1.

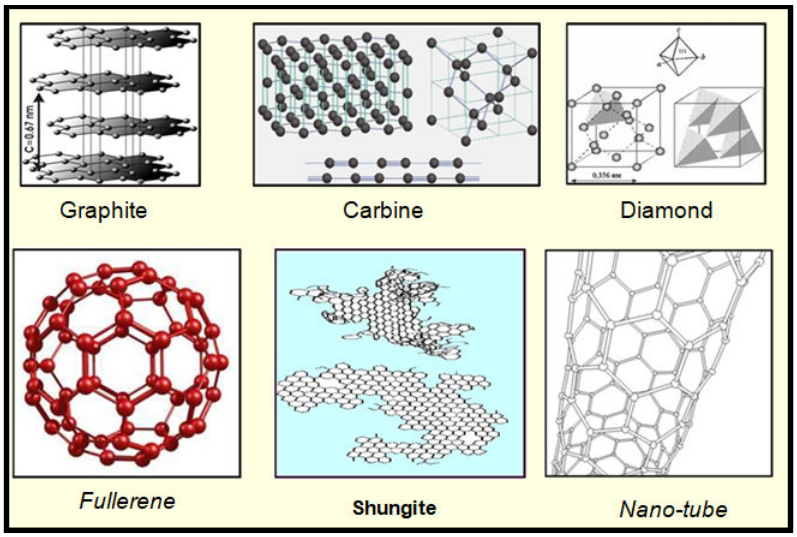

Fig 1: Polymorphs of Carbon.

Millions of tonnes of fullerenes-shungite are known to occur in the 2000-million year old Proterozoic rocks in Karelia Republic of Russia since 1717 and in Almaty Region of Kazakhstan since 1986. The work published on Mangampet barytes mine owned by Andhra Pradesh Mineral Development Corporation (APMDC) Ltd in the Bangalore-based Journal of Geological Society of India in 2007 by Geological Survey of India of Nagpur and Hyderabad, Stanford University and Cihergen Biosystems of San Francisco, Department of Airborne Mineral Surveys & Exploration (AMSE) of Bangalore and Jaipur, Pune University and National Geophysical Research Institute (NGRI) led India to become the third country in the world to carry millions of tonnes of fullerenes-shungite (Figs 2 and 3). The APMDC has been mining and exporting barytes lumps since 1975 mostly as a weighting mud in oil-well drilling. With boosting of its annual production to 3 million tonnes, the deposit gets exhausted soon with over 200 million tonnes of fullerenes-shungite remaining as waste around the mine.

The naturally occurring shungite water at Karelian village – Shun'ga finds use in the overall improvement of human health by removing contaminants including pathogenic bacteria and improving the function of the gastrointestinal and excretory systems, reducing skin irritation, increasing enzymatic activity, stimulating the ability of tissues to regenerate and improve the overall resistance of body's cells. Besides curing human diseases, this water is also used to keep healthy people to remain healthy.

Fig 2: A Google Earth Pro image of Mangampet Barytes Mine in an area of 552 acres showing fullerenes-shungite dumps.

Fig 3: A photo of the Mangampet Barytes mine showing fullerenes-shungite (black) and mine waters (blue).

Several properties of fullerenes-shungite made both Russia and Kazakhstan to use them on a large scale for a variety of purposes both within and outside their countries in medicine, metallurgy including Ferro-alloys and silicon carbide, mercury and rocket-fuel decontamination and oil spills, filler in tyres, rubbers, plastics, paints, remediation of solid wastes and wastewaters of biological, agricultural and industrial origin, removal of harmful constituents in surface and shallow ground waters, soil stabilization, reclamation of alkaline soils, enhancement of soil moisture and fertility, increased plant growth and enhancement of crop yields and manufacture of feed additives. Carbon-Shungit Ltd of Russia and Koksu

Mining Co of Kazakhstan are two private companies monopolising mining, processing and marketing of these materials.

Fullerenes – new polymorphs of carbon were synthesised in 1985 by three scientists of the Rice University in USA and University of Sussex in UK for which they received the 1996 Nobel Prize in Chemistry. These polymorphs occur as hollow cages of high symmetry and high stability with varying number of carbon atoms making each cage. Based on the number of carbon atoms making each cage, different types of fullerenes such as C_{60}, C_{70} and C_{84} are recognised. The greatest advantage with these cages is that trillions of nanometre-size atoms and other particles such as viruses get permanently trapped in these cages. While this ability is less in shungite, it is much more in fullerenes and gets increased with the number of carbon atoms forming the cages. Modern research in fullerenes and their chemical derivatives is directed towards nanotechnology, development of alternate energy devices such as solar/fuel cells, and extending the end of life.

With a view to bring a tie-up between the APMDC and Nano-C, I appraised the Management team of the Boston-based Nano-C in 2016 on the large-scale occurrence of natural fullerenes-bearing shungite in the Mangampet barytes mine, which could be used to manufacture fullerenes at a cost several times less than the present cost of fullerenes from carbon soot (Fig 4).

Fig 4: A photo showing my meeting with the Management Team of Nano-C: Viktor Vejins - President and CEO (Standing Right), Dr. Henning Richter – Vice President, Research and Development (Standing Left), Dr. Ramesh Sivarajan - Vice President, Applications Development (Sitting Left), and Tom Lada – Vice President, Operations (Sitting at Centre) at Nano-C Headquarters at 33 Southwest Park, Westwood, MA 02090, USA on 13 May 2016.

Hyderabad-based Creative Fullerenes Private Limited (https://www.indiamart.com/creative-fullerenes-private-limited/) created by Vakkanti Koteswar Rao assisted by his daughter Vakkanti Vandana, a B.Tech. Student of Nanotechnology in Chennai is the first company to use Mangampet fullerenes-shungite in the extraction of natural fullerenes and manufacture of shungite water since 2018. They found this water to keep healthy people free from infection besides curing very fast deadly diseases such as cancer, kidney diseases, fluoride toxicity,

skin irritation, poor blood circulation, respiratory problems and joint pains (arthritis), viral infection including Covid-19. Their cost of manufacture is several times lower than the prevailing cost of manufacture of synthetic fullerenes. Patenting their methodology is at an advanced stage of completion.

I have been motivating the faculty members of Sri Venkateswara University to emulate the work of Russia and Kazakhstan in finding uses to the processed Mangampet fullerenes-shungite.

Fig 5: A photo showing my meeting with Prof T Vijaya of SVU Botany Department using processed Mangampet fullerenes-shungite to enhance soil fertility and plant growth and Dr. P. Akhila Swathantra of Chemical Engineering Department in the purification of natural waters.

Soon after Dr Peddireddy Ramachandra Reddy became the Minister for Mines and Geology under the YSR Congress Party headed by the Chief Minister Y.S. Jaganmohan Reddy, I have been appraising him on the urgent need to harness Fullerenes-Shungite in Mangampet Barytes mines for the overall benefit of Andhra Pradesh.

Fig 6: Photo showing meeting with Dr Peddireddy Ramachandra Reddy, AP Mines & Geology Minister at my Tirupat residence on 7 Nov 2019.

The work of Dr Yadavalli Sivaramakrishna of Irving (TX)-based Lynxbioscience LLC confirmed how large-scale manufacture and usage of natural fullerenes from Mangampet fullerenes-shungite can boost up the economy and job potential of Andhra Pradesh in a big way (Sivaramakrishna, 2019). He met the concerned people in the APMDC to explain how his services would be useful for the overall benefit of Andhra Pradesh (Fig 7).

Fig 7: Photo showing my meeting with Dr Yadavalli Sivaramakrishna of Irving (TX)-based Lynxbioscience LLC and his team along with my colleague Prof R.C. Hanumanthu at Tirupati on 8 Jan 2020.

My recent work indicated that the processed Mangampet mine waters have the same curative properties of the "Russian Shungite water" and the "Shungite water" manufactured by the Hyderabad firm. With extremely cheap production cost in large quantities and fast communication facilities by road, rail, port and air, this water could be made available to the entire world to improve the overall health of the world's population.