Nanocomposites and nanomaterials

Plasma-catalytic technology for carbon nanomaterials

Iu.P. Veremii[1], K.V. Iukhymenko[1], V.Ya. Chernyak[1], M.M. Kasumov[2]

[1]*Taras Shevchenko Kyiv National University, Dept. of Physical Electronics, Volodymyrska str. 64, 01033 Kyiv, Ukraine.*
E-mail veremii@i.ua

[2]*Vernadsky Institute of general and inorganic chemistry of the NASU, Akademika Palladina prost,* 32/34, *03142 Kiev, Ukraine.*

The nanomaterial-based technology is very attractive in terms of opportunities for their applications. However, the development of nanotechnology has some difficulties in the fields of synthesis, purification and separation of nanomaterials with varying morphology.

This situation can be improved by the creation of a process that allows for the implementation of continuous nanomaterials production without using catalysts, which will simplify the cleaning process and reduce the cost of the final product. We understand continuity as the uninterrupted transfer of products out of the systems combined with a long service life of the set-up.

Presented plasma-liquid system for generation of carbon nanomaterials is based on the tornado-type discharge (discharge with reversed-vortex gas flow) in a mixture of ethanol spray and inert gas. Using liquid as a source of carbon will make the process safer, environment-friendly and will significantly decrease electrodes erosion.

The plasma-liquid reactor combined with pyrolytic chamber has the ability to operate continuously. The system can produce the carbon structures with different morphologies depending on the electrode materials and the temperature of pyrolytic chamber.

The resulting samples consist of nanostructured carbon: carbon rods with diameter of 70-100nm and length of 10μ and nanotubes with diameter of 5-50nm. Overall, the system demonstrates the possibility of large-scale carbon nanomaterials production.