Diagnostics of nitrogen-doped carbon prepared by polyaniline pyrolysis

Shishov M.A.[1], Sapurina I.Yu.*

[1]*St.-Petersburg State Electro-Technical University "LETI" St.-Petersburg, 19736 St.-Petersburg, Russia*
**Institute of Macromolecular Compounds RAS, 199004, St.-Petersburg, Russia*
**e-mail: sapurina@mail.ru*

Nitrogen is the best dopant of carbonaceous materials due to its strong electron donating properties and atomic size being similar to that of carbon. Nirogen-doped carbon (NdC) demonstrates improve electron field emission properties because of reduced work function, save as the best support for the heterogeneous catalysis showing synergetic catalytic effect, hardly increased specific capacitance to cations and can be promising material for battery and supercapacitors.

Now the new NdC with high nitrogen content were prepared by pyrolysis of conducting polyaniline (PANI) and its composites and studied by the methods of electron microscopy, Raman and FTIR-spectroscopy, conductometry, thermogravimetric- and BET-analysis. Thermodestruction of PANI proceed at the range of 400-900°C at inert atmosphere and lead to chains cyclizatons were C=N (sp^2C-N) and C–N (sp^3C-N) bonds between nitrogen and carbon obtained. The atomic concentration of nitrogen was estimated by chemical elemental analysis and depending on pyrolysis conditions changes from 6 to 15%. The conductivity and specific surface area of NdC reach 10^{-4} S cm^{-1} and 350 m^2 g^{-1}. The morphology of prepared NdC can be very different and changes from 3D and 1D to complex hierarchical structures, since the morphology of polymer-precursor did not destroyed during the pyrolysis.

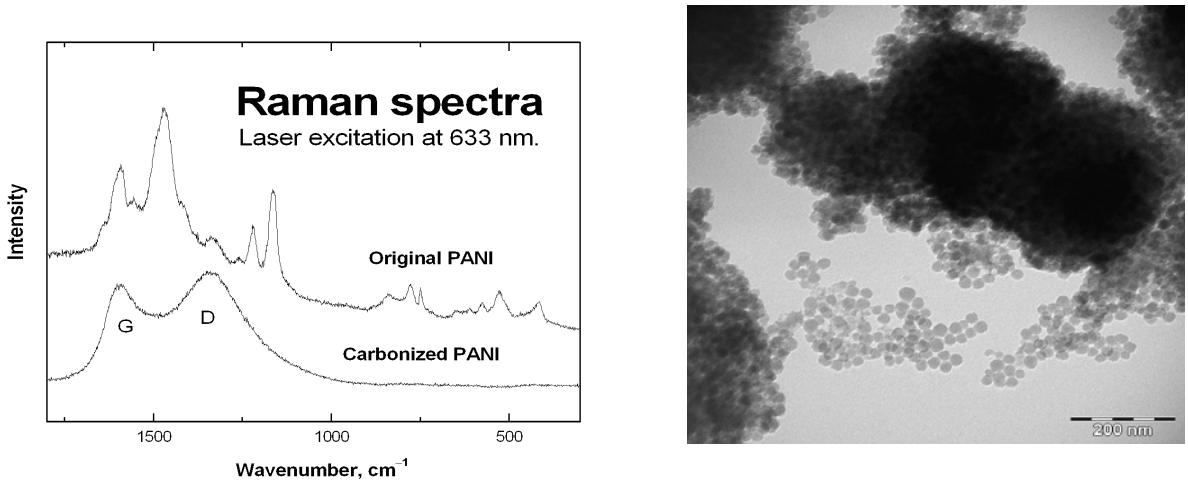

Figure. Raman spectra of PANI and carbonized PANI, transmission electron microscopy of carbonized PANI of 3D structures.