

## Nanostructured surfaces

### Raman observation of carbon nanoclusters in boron-ion implanted polymethylmethacrylate

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Recently, the concept of formation of defects during radiation damage of polymer structure with appearance of free radicals at lower ion doses ( $< 10^{16}$  ions/cm<sup>2</sup>) and carbonization at higher ion doses ( $> 10^{16}$  ions/cm<sup>2</sup>) has been verified [1] for boron-ion implanted polymethylmethacrylate (B:PMMA) with the energy of 40 keV, ion doses from  $6.25 \cdot 10^{14}$  to  $5.01 \cdot 10^{16}$  ions/cm<sup>2</sup>, and current density of 2  $\mu$ A/cm<sup>2</sup> by measuring of Doppler broadening of positron annihilation rays as a function of incident positron energy and positron annihilation lifetime at positron energy of 2.15 keV. As an additional test, a first time the expected carbonization in the B:PMMA has already been examined [2] by Raman spectroscopy and electrical measurements. In the present work, the detail analysis of Raman spectra showing the appearance of carbon nanoclusters or graphene like structures, exemplified by D, G and 2D Raman peaks, in the B:PMMA at higher ion doses is presented.

1. Kavetskyy T., Tsmots V., Kinomura A., Kobayashi Y., Suzuki R., Mohamed H. F. M., Šauša O., Nuzhdin V., Valeev V., Stepanov A. L. Structural defects and positronium formation in 40 keV B<sup>+</sup>-implanted polymethylmethacrylate // J Phys Chem B.-2014.-**118**.-P. 4194-4200.
2. Kavetskyy T. S., Nowak J., Borc J., Rusnák J., Šauša O., Stepanov A. L. Carbonization in boron-ion implanted polymethylmethacrylate as revealed from Raman spectroscopy and electrical measurements // Spec Lett.- in press.