



Contribution ID: 141

Type: Poster

Channeling Of Low Energy Atomic Particles In Carbon Nanotubes With Heterojunctions

Thursday, 29 September 2016 18:40 (1 hour)

Channeling of low energy atomic particles in carbon nanotubes is interesting for low energy ion implantation, local ion plasma enhanced deposition, chemical-biological and medical atomic particles transport application [1]. Carbon nanotubes are useful as ion beam management system parts. Temperature varying along the nanotube production process allows us to vary the CNT diameter, which creates nanotube heterojunction [2]. Each heterojunction could be used as an aperture for the ion beam. In this work the influence of the heterojunction on low energy ion channeling is studied.

Impact ions are randomly distributed along the CNT cross-section. The ion impact angle is varied in a 1.4° range and the initial azimuthal angle is randomly distributed.

Ions with a starting energy of about 300 eV per nucleus and an initial angle of 15° are channeled through the heterojunction. This will be shown. For example, a (20,0)/(10,10) heterojunction is effective as an aperture and decreases the initial ion beam diameter by up to 20%.

References

1. Z.L. Mišković, Radiation Effects and Defects in Solids 162 (2007) 185.
2. Y. Yao, et al., Nat Mater, 6 (2007) 283

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Session Classification: PS3: Poster session