



Contribution ID: 73

Type: **Poster**

PS3-20 Influence of Carbon Nanotube Walls Elastic Waves on Slow Particles Channeling

Thursday, October 9, 2014 5:00 PM (1h 30m)

Slow particles channeling in carbon nanotubes (CNT) is applicable to physical vapor deposition processes (PVD), ion beam assisted deposition (IBAD), focused ion beam (FIB) modification of thin film materials and driving of ion beam. Slow moving channeling particles in CNTs may excite elastic waves of the nanotube walls [1]. We provide molecular dynamic simulation of 100 eV Ar⁺ ion channeling in single wall CNT with similar diameters but different chiralities (10,10), (11,9) and (17,0). Ions starts from axis with angles 10-30° relatively to axis of nanotube. Scanning in the azimuthally angle was provided. It is possible, that velocity of elastic wave propagation and the particle's velocity match when the last one moves under high angle to the nanotube axis. The phase of channeling particle trajectory in the carbon nanotube determines its interaction with elastic deformation of CNT wall. This fact leads to decreasing particle energy losses in scattering with carbon nanotube. Decreasing energy losses in 1.5-3 times provides increasing traversed path of the channeling particle. Discovered regularities can applied in low energy ion beam driving devices engineering.

References

1. Mišković, Z.L., Radiation Effects and Defects in Solids, (2007). 162 (3-4): p. 185-205

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Session Classification: Poster Session