

Modifying Tungsten and Molybdenum Disulphide nanotube structure by Rhenium ion implantation

WS₂ and MoS₂ inorganic nanotubes are ideal for mechanical applications, because of their low friction coefficient. Also, by implanting different ions in their structure, their mechanical properties can be improved, thus making them more suitable for certain biomedical applications.

Five WS₂ nanotube pellets were previously implanted with Niobium, but due to the low implanted dose major changes did not occur. However, the changes in the electrical properties of the pellets and the RBS analysis are promising. We did see a strange behaviour of the electrical resistance when the Nb was implanted in the sample. Further studies on these samples need to be made in order to obtain a better image of their topography and morphology (SEM, TEM, AFM).

Our aim is to substitute the Tungsten or the Molybdenum in the nanotubes with Rhenium, respectively with Niobium, in order to make RhS₂/NbS₂ nanotubes and to see the differences in their mechanical and electrical properties. Taking into account that during the preliminary tests ~30 hours were necessary to implant $2 \cdot 10^{15}$ atoms/cm², we estimate that for the future studies, we need 10 days of beam time at the 3 MV Tandatron Accelerator at IFIN-HH. The beam energy will be varied between 300 KeV and 3 MeV. Also, for RBS measurements, an alpha particle beam will be used (3Mev).

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Beam time request (unit=8hours): 30 units

Desired period: October-November 2014

Desired beam properties: type: Rhenium and alpha particles; energy: 0.3-3Mev;