

PO2054

Hydrogen Influence on the Synthesis of Tungsten Nanoparticles by Magnetron Sputtering Combined with Gas Aggregation.Tomy Acsente¹, Lavinia Carpen¹, Gheorgh  Dinescu¹, Elena Matei², Christian Grisolia¹I.N.F.L.P.R., Magurele, Romania ²I.N.C.D.F.M., Magurele, Romania ³CEA IRFM, Saint-Paul-lez-Durance, France

acsente@yahoo.com

Tungsten nanoparticles with size in the range of 60-100 nm are produced using a cluster source based on magnetron sputtering combined with the gas aggregation technique. The metallic vapors obtained by sputtering are cooled down in the flow of the inert gas (argon); nucleation centers appear first, then the nanoparticles grow subsequently by accretion and coagulation and they are ejected from the cluster sources as a beam of particles. An undesired effect is the slowing down and cease of the deposition process in about 30 minutes, suggesting the dependence of the deposition rate on the presence of residual gases which are gradually consumed during the process. We show that by deliberately mixing the argon with small amounts of hydrogen the production of tungsten nanoparticles become continuous. Moreover, an oscillatory behavior of the main process parameters (target selfbias, pressure in the cluster source, intensity of the optical emission lines and the deposition rate) was noted. We present the correlation between the variation of these parameters, with the nanoparticles growth rate and morphology.

Keywords

nanoparticles

tungsten

gas aggregation source