

Obtaining copper nanoparticles in glow discharge at excitation of sound waves in a gas-discharge tube

Fadeev S.A.^{1,®} and Shaidullin L.R.^{1,2}

¹ Institute of Mechanics and Engineering, FRC Kazan Scientific Center, Russian Academy of Sciences, 2/31, Lobachevsky str., Kazan, 420111, Russia

² Kazan National Research Technical University named after A N Tupolev—KAI, Karl Marx Street 10, Kazan, 420111, None

® fadeev.sergei@mail.ru

Experimental results are presented on the obtaining of copper particles in a medium pressure glow discharge at sound wave excitation in a gas-discharge tube with two plane-parallel, cooled copper electrodes. After ignition of the discharge in argon, the sound waves were excited using a speaker attached to the tube through a confuser.

Formation of particles occurs when individual atoms, obtained due to cathodic sputtering, are recruited and arranged in an ordered structure, i.e. enlargement of initial elements (copper) to particles is achieved. The morphology of the particles was investigated using scanning electron microscopy. Sub-micron particles and nanoparticles were obtained. The formed particles have a shape close to octahedral. The formed particles acquire a crystalline structure due to local heating owing to surface plasma-chemical reactions [1, 2]. Since in the glow discharge plasma the temperatures of electrons and ions are very different ($T_e \gg T_i$) [3], the tube walls and particles are negatively charged [4]. This is indirectly evidenced by the deposition of particles on the upper electrode (anode), in the opposite direction of gravity.

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