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# High Power Pulsed Hollow Cathode for Nanoparticle Synthesis

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The increasing use of nanoparticles in technical devices has led to a demand for nanoparticles with well-defined characteristics, *e.g.* sizes and size distributions. It is therefore important to have a method which can produce nanoparticles of different materials with a specific size and narrow size distribution. Plasma-based methods often meet the demands of high-tech implementations, but have a problem with productivity and scalability. Our novel plasma-based method utilizes the fact that nanoparticles in a plasma acquire a negative charge and that the probability to collect ions on the growing nanoparticles thereby is much larger than for neutrals. If the material, from which the nanoparticles should form, is ionized to a high degree, the growth speed of the clusters increases, which could lead to a more efficient nanoparticle production. Here, we present our first results on the synthesis of Cu nanoparticles using our method with a high power pulsed hollow cathode, which ensures that a highly ionized plasma is formed. The material is sputtered from the hollow cathode and the nanoparticles are formed in the gas phase. The use of high power pulses introduces many parameters which can be used to affect the nanoparticle growth. It was found that the nanoparticle size can be changed by changing *e.g.* the pulse frequency and the pulse power. The hollow cathode was also powered with DC to compare with the high power pulsed case. It was found that larger particles were produced with the high power pulsed hollow cathode compared to the DC case for the same average powers.

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