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Research Highlight

'Stability of nanoparticle production by atmospheric-pressure spark ablation'

Summary

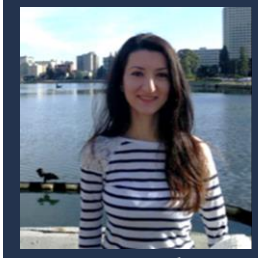
Spark ablation is a gas-phase synthesis method for generating nanoparticles from conductive materials in the form of electrodes. The process relies on spark discharges forming a plasma between two conductive electrodes, heating them up and consequently evaporating small amounts of the material they consist of. The resulting vapors are subsequently quenched and carried away by a gas flow, forming nanoparticles upon nucleation and growth.

In this study, we investigate the stability of nanoparticle production by atmospheric spark ablation.

Impact

This research significantly enhances the current understanding of nanoparticle production via atmospheric-pressure spark ablation by demonstrating the critical impact of electrode composition and carrier gas on stability. For materials, like palladium (Pd) and nickel (Ni), which don't react with nitrogen (N_2), the production of nanoparticles was stable no matter if nitrogen or argon (Ar) gas was used. However, for materials like aluminum (Al) and magnesium (Mg) that easily form compounds with nitrogen, the nanoparticle production became unstable when nitrogen was used. This instability is due to the formation of a nitride layer on the electrodes, which changes their properties and affects the process. Using argon gas instead of nitrogen helped maintain stable nanoparticle production for these reactive materials.

Authors' bios



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Reference

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