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Application of laser diagnostics on particle technology processes

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ABSTRACT

High porous metal nanopowders are useful filler materials in conductive polymer-matrix composites, because they combine electrical conductivity with improved thermomechanical properties of the composite. These ultrapure powders, which are produced in the Inert Gas Condensation (IGC) process, develop from coalescence growth and coagulation processes of metal vapor in a helium gas as a result of succeeding nucleation. The agglomeration of silver nanoparticles in such an aerosol has been monitored on-line as a function of background pressure and particle content in the aerosol. Various laser optical methods have been used to prove quantitative measurement of the particle velocity, as for example: Laser Doppler Anemometry (LDA) and Particle Image Velocimetry (PIV). The results are correlated with the data which has been obtained from microscopically observation and discussed by using models for aggregation due to particle diffusion in a laminar gas flow.