Abstract Submitted
for the GEC17 Meeting of
The American Physical Society

Nanoparticle formation from HMDSO in an atmospheric pressure plasma jet[1] ROGER WALLIMANN, GINA OBERBOSSEL, DENIS BUTSCHER, PHILIPP RUDOLF VON ROHR, ETH - Zurich — Nanoparticles are admixed to fine powders to enhance their flowability. In industry, this is mostly done in time consuming batch processes. As an alternative which could be used in a continuous process, the silica nanoparticle formation in plasma was investigated. For nanoparticle formation, HMDSO, argon and oxygen were used in an atmospheric pressure plasma jet powered by a sinusoidal high voltage generator. Oxygen levels, gas flow and frequency were varied to find optimal particle production conditions. The particles were collected using an electrostatic precipitator. HMDSO dissociation and conversion was determined by weight measurements of the precipitator tube. Particles were analyzed using FTIR and SEM to attain their composition and size, respectively. Conversion rates were in the range of 3 to 10%. Below a frequency of 70 kHz, only film formation occurs since most of the nuclei are lost on the channel walls. Optimal oxygen levels for maximum yield was shown to be 2.5%, below and above, dissociation was limited by power input and plasma quenching, respectively. Particle size was in the range of 30-60 nm and increased slightly with decreased volume flow. The composition of the films and particles were silica-like with a low amount of carbon.

[1]Gebert Ruef Stiftung, Fondation Claude et Giuliana

Roger Wallimann
ETH - Zurich

Date submitted: 11 May 2017 Electronic form version 1.4