SYNTHESIS of Si-BASED NANOPARTICLES by
ATMOSPHERIC-PRESSURE MICROPLASMA

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A microplasma\(^1\) reactor for generating group IV nanoparticles
(e.g. Si, SiC etc.) in atmospheric pressure has been prepared.
The plasma is generated by 13.6 MHz radio frequency source
using He and Ar as buffer gases and a range of gaseous and
liquid precursors such as silane or tetramethilsilane. The
electrical and optical properties of the plasma have been
explored by RF IV-probe and optical emission spectroscopy
(OES) demonstrating the existence of stable atmospheric
plasma with dimension less than 1mm to a few millimeters.
The plasma parameters including gas temperature, electron
density and temperature have been calculated using the results
from OES measurements. Additionally, the effect of varying
other parameters such as; reactor configuration, delivered
power and gas flow has been explored. Thus plasma
diagnostics have been used to understand the nanoparticle
formation mechanism in this specific type of plasma. The
produced Si-based nanoparticles are characterized by several
tools including UV-Visible absorption spectroscopy, Fourier
Transform Infra-red spectroscopy, Raman-spectroscopy and
photoluminescence\(^2\).

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2. J. McKenna, J. Patel, S. Mitra, N. Soin, V. Svrcek, P.
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of nanomaterials by atmospheric-pressure microplasmas”, Eur.