

Size and surface controlled optical properties of Si nanoparticles

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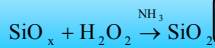
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Efficient light emission from Si nanoparticles depends critically on:

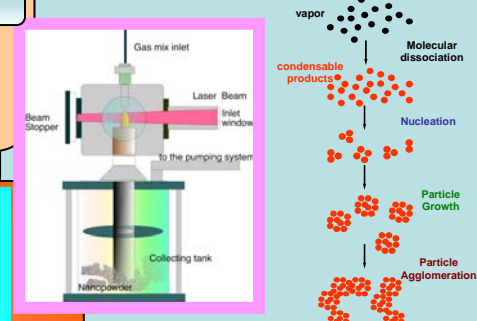
small particle size and narrow distribution

wet process for surface oxidation

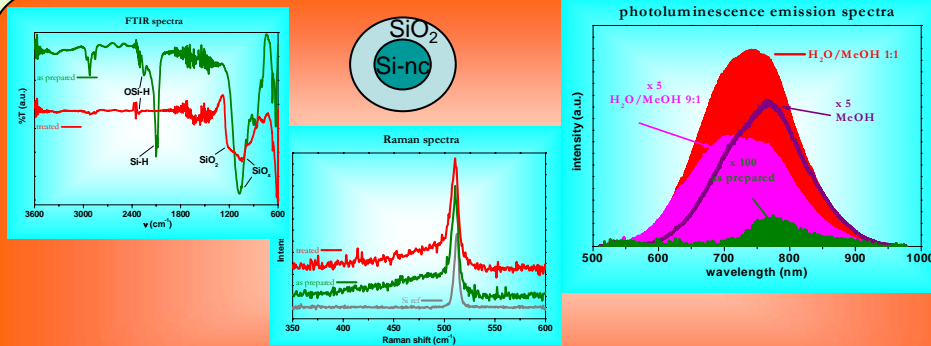
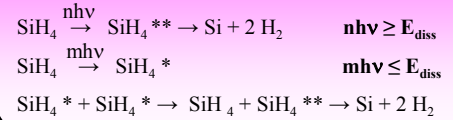


and surface passivation

Synthesis by laser-assisted pyrolysis



Vibrationally excited SiH_4 undergoes dissociation or transfer energy by collision to other molecules:



Spectroscopic characterization gives feedback on preparation and functionality

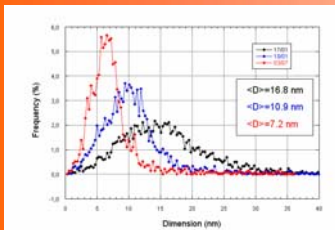
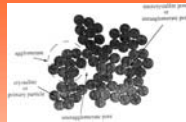
Preparation and assessment of the functional material

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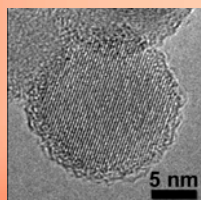
Dimensional characterization tools highlight different properties

X-ray diffraction: crystalline core size distribution



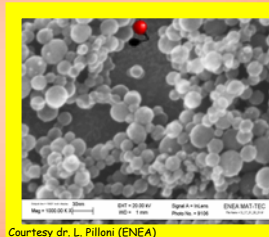
occurrence of quantum confinement

Transmission Electron Microscopy (TEM): crystalline size and quality



Courtesy prof. G. Mattei (Univ. Padova)

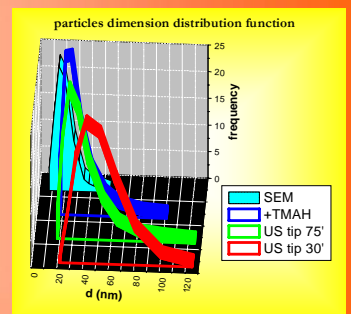
Scanning Electron Microscopy (SEM): dimensions and morphology of dry powders



Courtesy dr. L. Pilloni (ENEA)

evaluation of agglomeration state

Dynamic Light Scattering (DLS): size of colloidal particles in suspension



suitability of suspension for advanced (optical, biomedical) applications

Complete dimensional characterization of crystalline core, primary particles and agglomerates