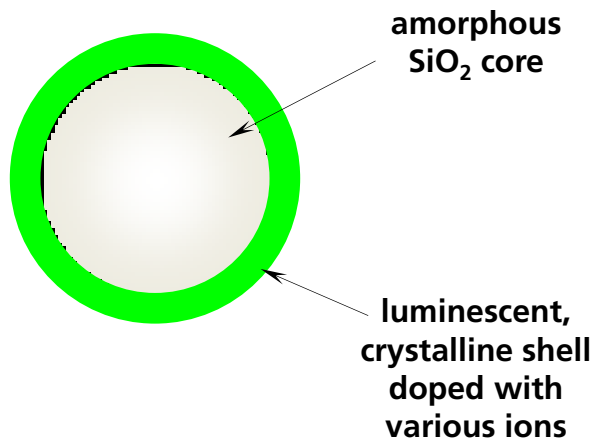


Inorganic Core/Shell Nanoparticles

General features

- Particle core: Amorphous SiO₂ core (d = 60 – 200 nm)
- Particle shell: Inorganic crystalline shell (thickness 5 – 10 nm)



- Available shell materials: Hydroxylapatite, zinc oxide, zinc silicate, calcium fluoride, titan dioxide
- Available doping ions: Eu³⁺, Eu²⁺, Tb³⁺, Sm³⁺, Dy³⁺, Yb³⁺, Er³⁺, Mn²⁺
- Available surface modification: Carboxyl, amine

Method of preparation:

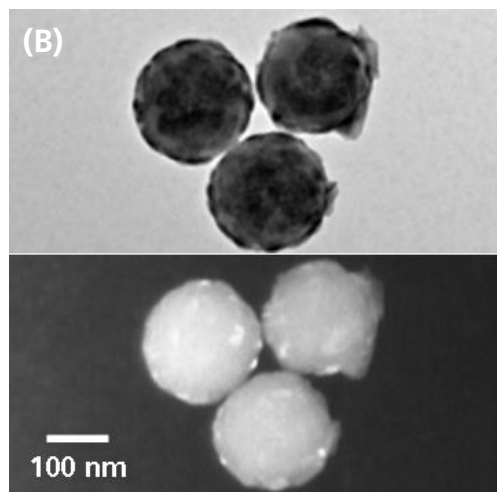
- Modified Pechini sol-gel process

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Advantages:

- Elegant design strategy: »building blocks« principle
- Defined particle morphology and size
- Narrow particle size distribution
- Adjustable particle properties: composition, size, crystal structure, optical properties, refraction index
- Variable modification of particle surface for their adaptation into different matrix materials
- High particle stability in various environments



(A) Core/shell nanoparticle powders under excitation with UV lamp ($\lambda_{\text{ex}} = 254 \text{ nm}$)

(B) TEM micrograph and dark field image of $\text{SiO}_2/\text{Zn}_2\text{SiO}_4:\text{Mn}^{2+}$ -core/shell nanoparticles

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