

# NSF's ChemMatCARS: A Synchrotron X-ray National Facility for Chemistry and Materials Research



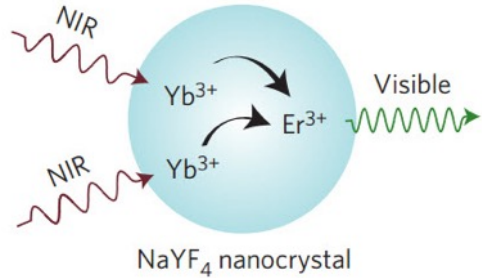
## Science Highlights in Anomalous Small Angle X-ray Scattering



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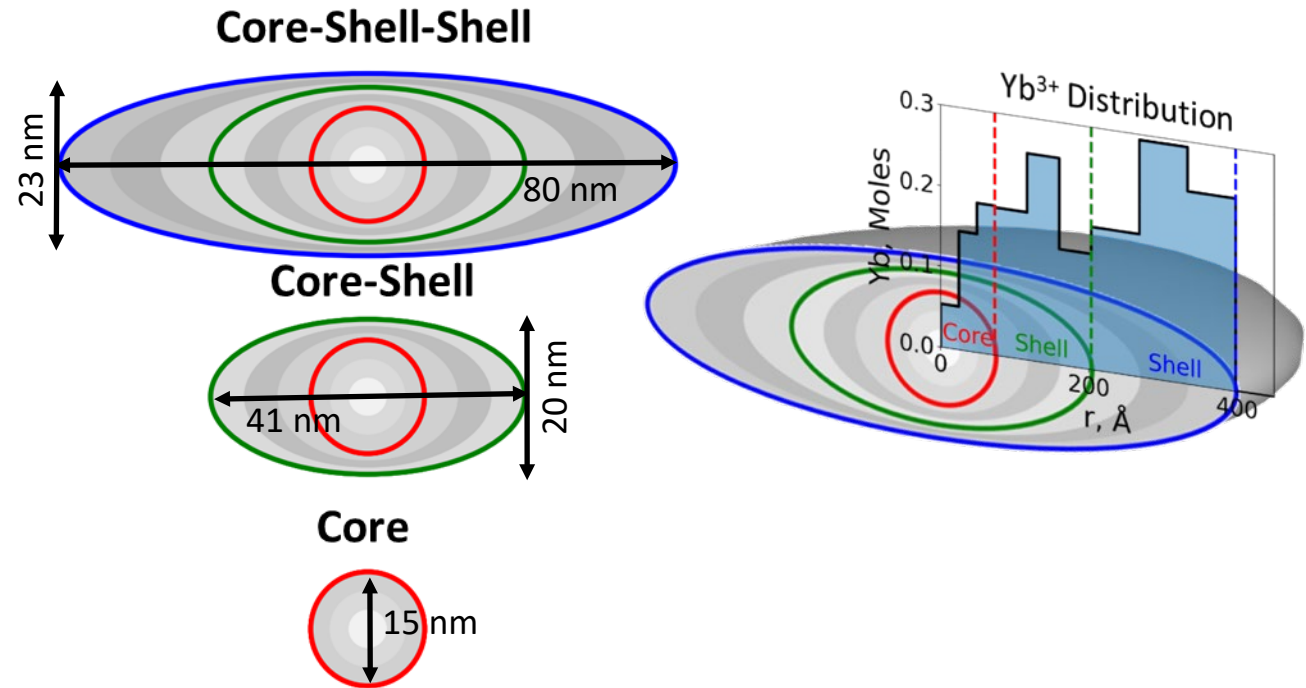
# Dopant Distribution within Upconverting Nanoparticles

## Upconverting Nanoparticles

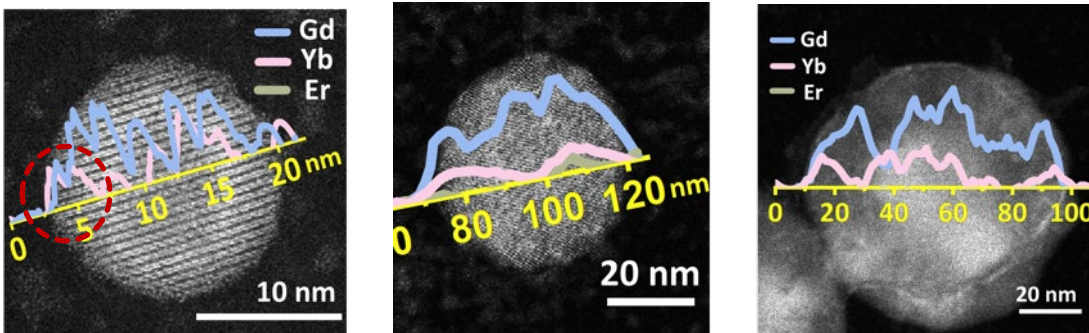
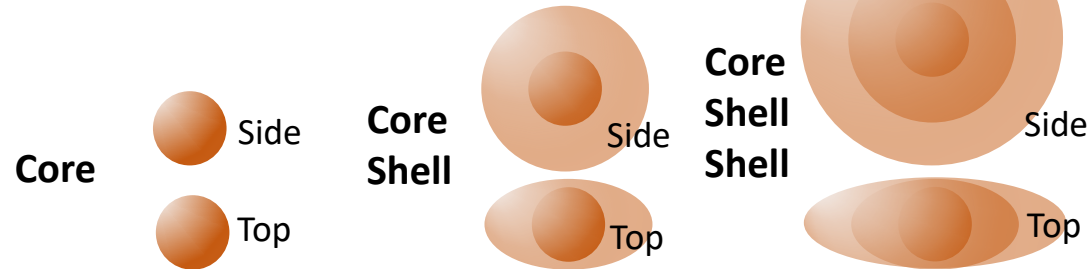


**Dopant (Lanthanide) distribution determines upconversion efficiency**

## Quantitative heterogeneous Yb<sup>3+</sup> distribution obtained from ASAXS measurements



## Multilayered NaGdF<sub>4</sub> oblate shaped nanoparticles doped with 20%Yb & 2%Er



Traditional characterization methods can only provide qualitative and depth averaged distribution information

- Oblate spheroid structure matches well with TEM measurements
- Non-monotonic Yb<sup>3+</sup> density along the major axis is observed

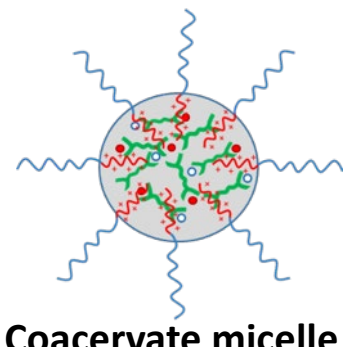
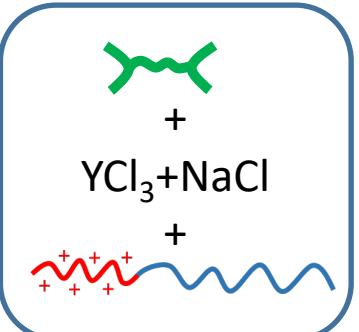
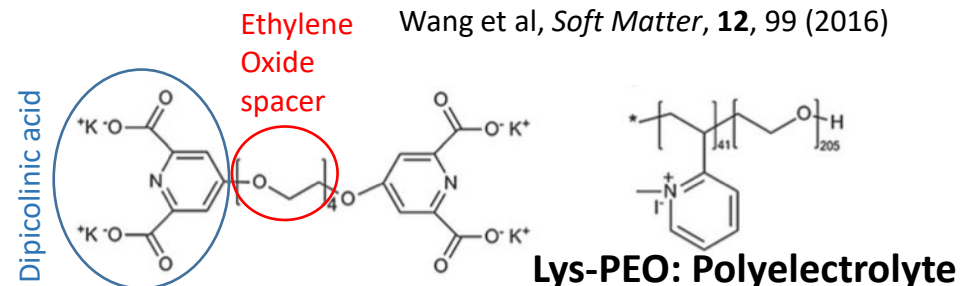


Ge Zhang

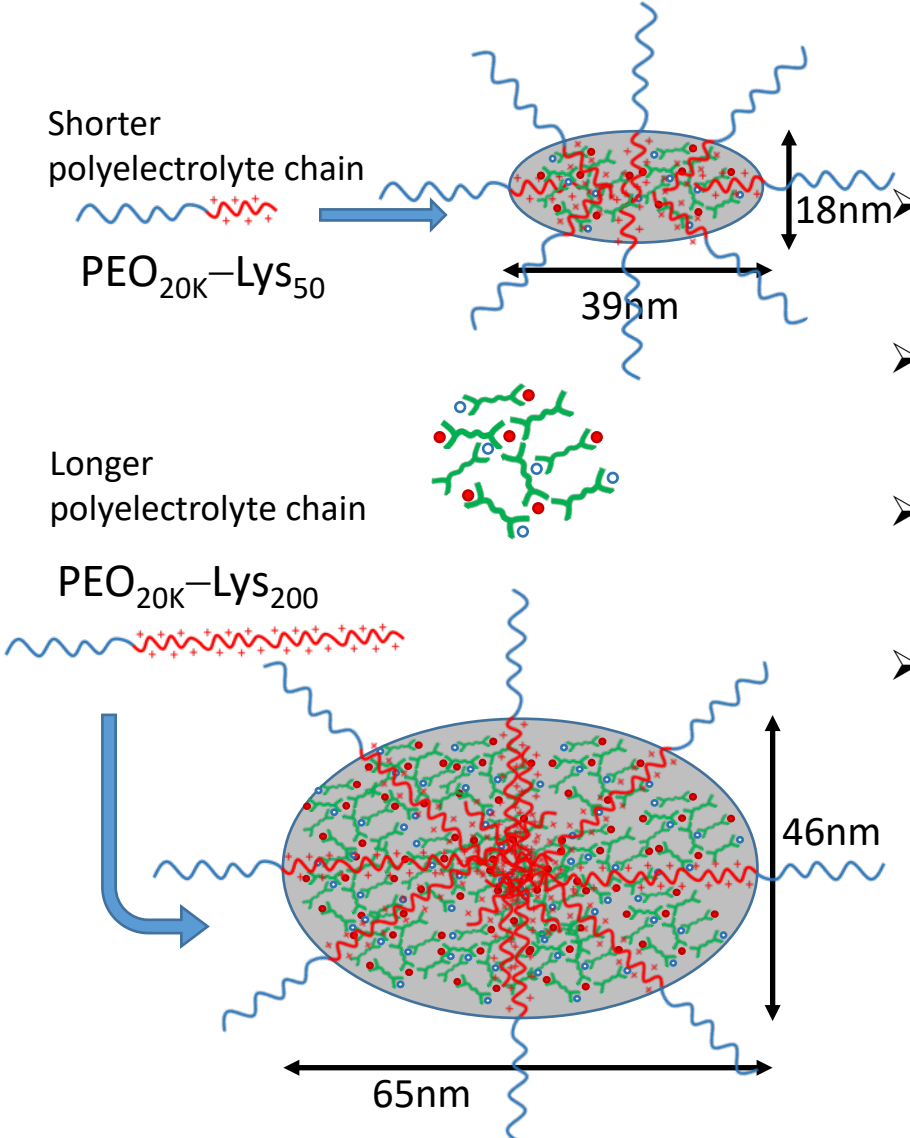


Mrinal Bera

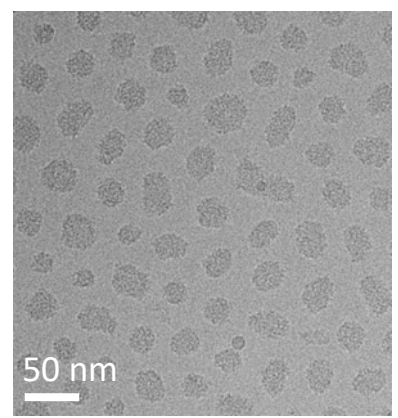
# Metal Ion distribution within Coacervate Micelles



## Quantitative determination of coacervate composition by SAXS measurements



- Prolate shaped micelles were observed
- Size of the micelles depends on the polyelectrolyte chain length
- Metal ions found to be uniformly distributed within the prolate core
- Coacervate complex composition obtained:



Cryo TEM shows spheroid shaped micelles



Alexander Marras



Mrinal Bera