

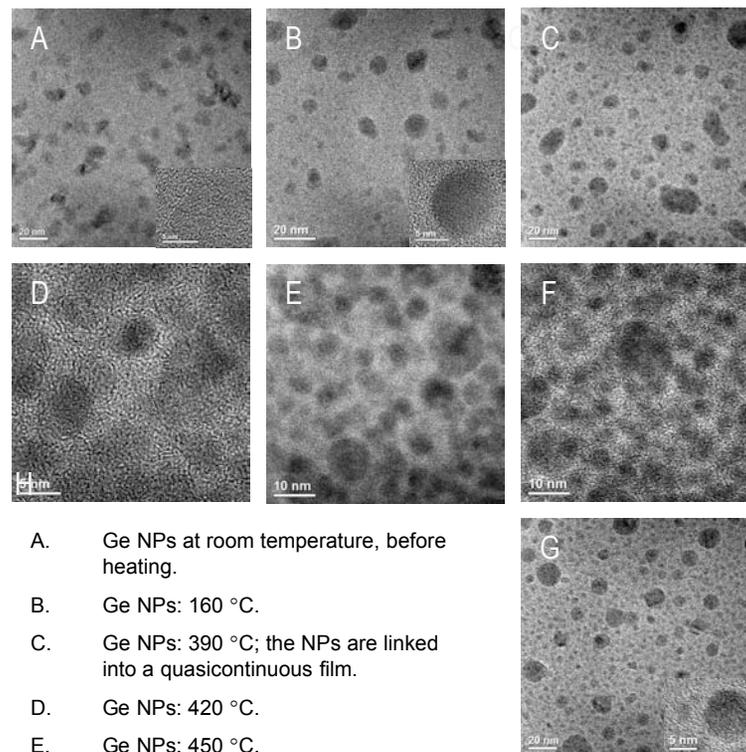
Thermal Behavior of Germanium Nanoparticles

Motivation:

- The future solar arrays in space thought to be a GaAs based photovoltaics on flexible substrate. Ge is lattice matched to GaAs and will be the transition layer between a flexible substrate and the GaAs photocell.
- Ge nanoparticles (NPs) provide a thin layer of material that will melt at a lower melting point than the bulk and can be easily deposited onto a flexible substrate.

Result and Significance:

- Single crystalline Ge NPs are successfully prepared at room temperature using sodium naphthalide as reductant.
- 300 °C to 450 °C the crystalline Ge NPs via Ge coming from the amorphous environment transform into quasi continuous film.
- NPs become amorphous ~ 480 °C to 500 °C
- the particles recrystallize after quenching the temperature down from 600 °C to room temperature.



- Ge NPs at room temperature, before heating.
- Ge NPs: 160 °C.
- Ge NPs: 390 °C; the NPs are linked into a quasicontinuous film.
- Ge NPs: 420 °C.
- Ge NPs: 450 °C.
- Ge NPs 590 °C: melting.
- Ge NPs cooled back to room temperature after heating to 600 °C.

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