Dust nucleation: what is the nature of the carbonaceous grains produced in evolved C-rich star envelopes and injected in the ISM?

Accretion and coagulation in the ISM:
- To what extend dust coagulation and growth participate to the variation of the cold dust FIR emissivity observed in diffuse and dense ISM? Can it be constrained?
- Can we distinguish carbon mantle growth on silicate and/or carbon grains vs coagulation of silicate and carbon grains?
- How efficient are the 2 processes? Are they compatible with dust destruction timescale in the ISM?
- Coagulation & coreshine: is coreshine an observational evidence of grain coagulation and/or accretion?
Ices:

- Are the non-thermal desorption processes fully identified (by observations) and characterized (in the lab)?
  What are the signatures (velocities? Internal energy? ortho-para ratio in protoplanetary disks?)

- Are the photodesorption rates measured for pure ices in the laboratory relevant to astrophysical media? What are the most critical species for which the photodesorption rates need to be known with accuracy?

- Is the wavelength-dependence of photolysis important for astrochemical models? What do we know about ice photochemistry versus photodesorption?

- How non-thermal energetic processes can desorb intact complex organics species?