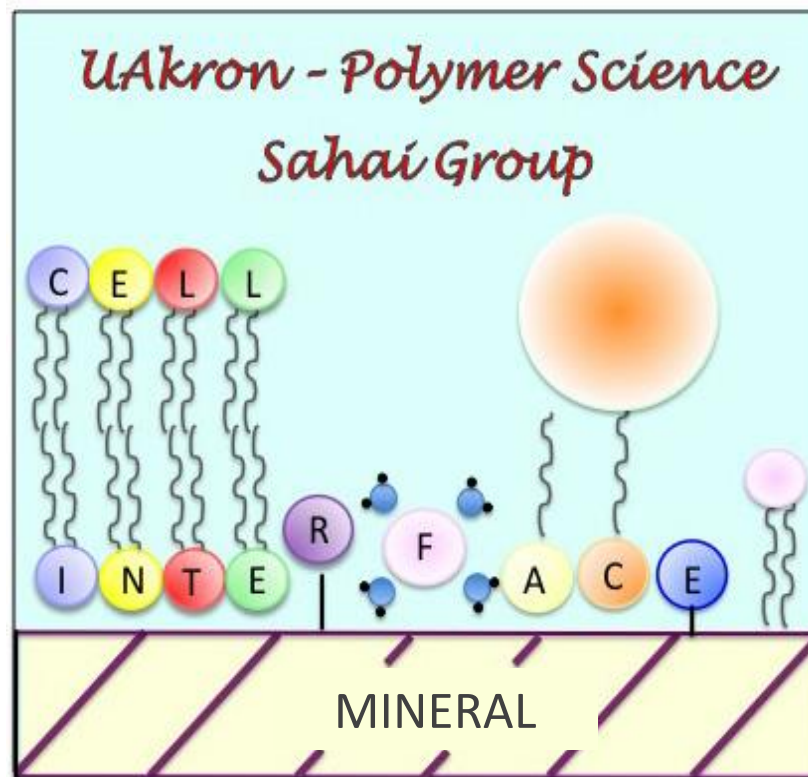


Organic-Nanoparticle Interactions in the Origins of Life and in Bone Biomineralization



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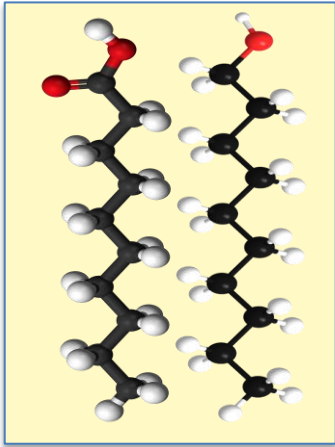
Please note that almost all the slides in this presentation were based on unpublished data. Therefore, I have not included them here.

The slides on the Origins of Life describe the role of photocatalytic minerals in promoting a protocell metabolism. The relevant manuscript is currently under review at *J. Phys. Chem. C*. Two additional slides on the role of minerals in protocell membrane self-assembly have been published in *Sci. Rep.* (2017) and are included here.

The slides on the role of peptides in calcium phosphate mineralization of relevance to bone biomineralization are in preparation for submission to *J. Phys. Chem. C*.

1a. Effect of Minerals on Model Protocell Membrane Formation Rates

Fatty acids/alcohols

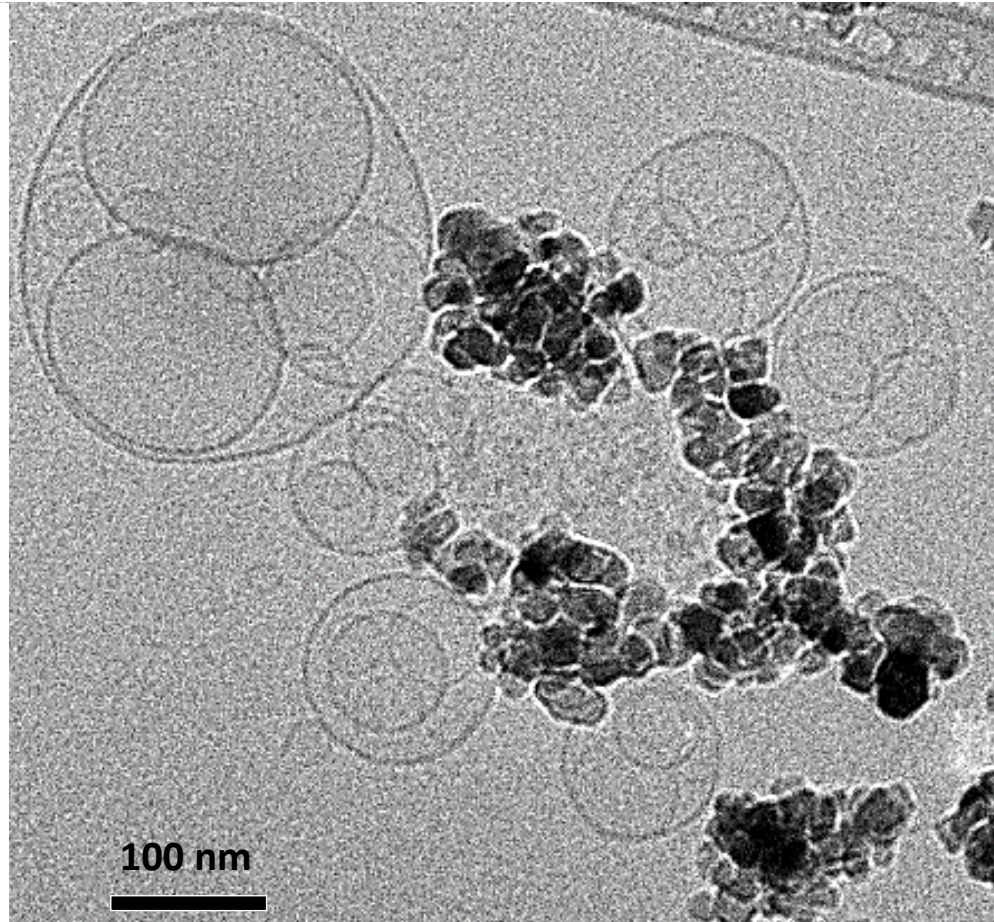


decanoic acid(DA);
decanol (DOH)



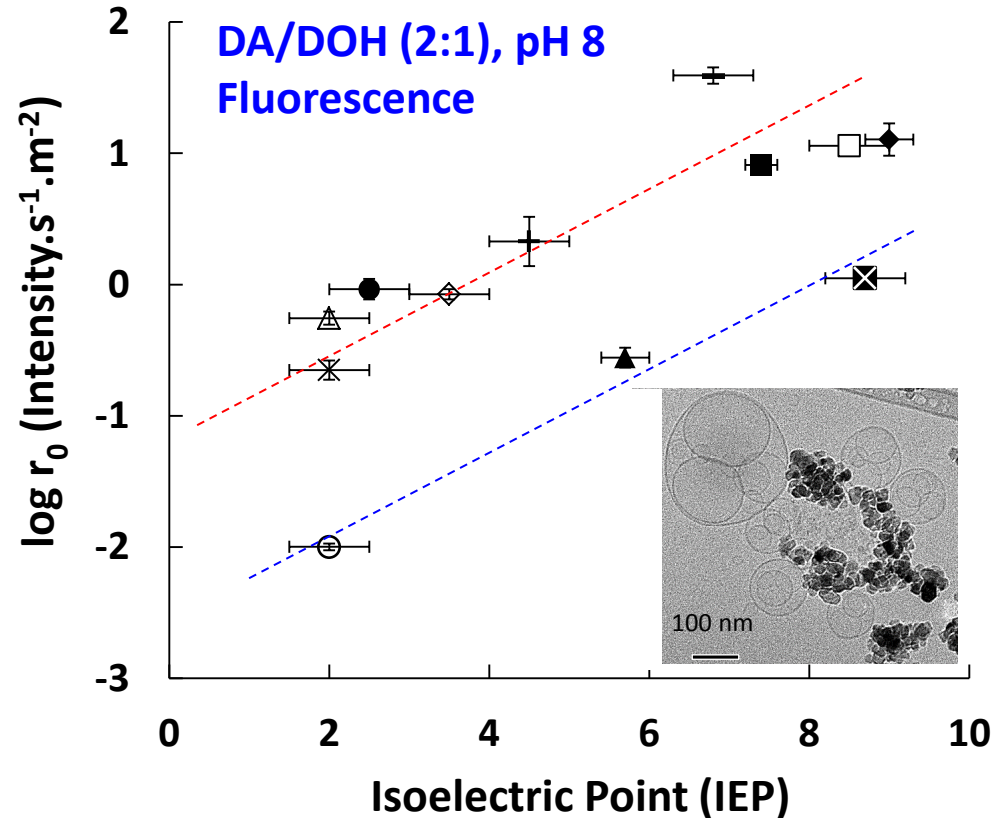
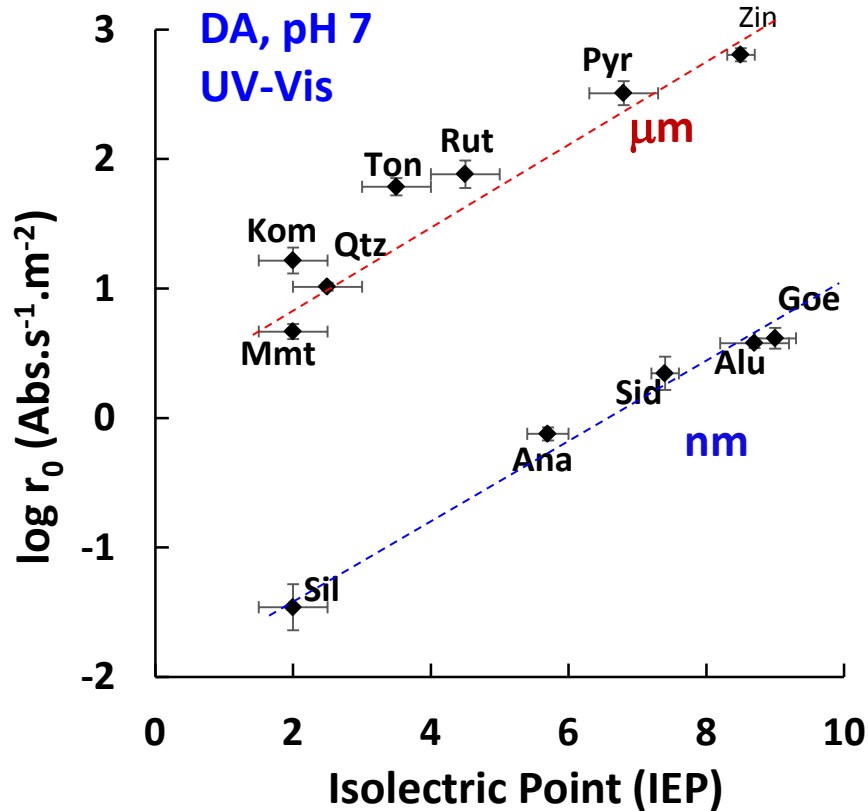
vesicle (model protocell)

DA/TiO₂



Model Protocell Membrane Formation Rates

Accelerated Membrane Formation-Rate with Increasing Mineral IEP



- All minerals and rocks tested significantly promoted initial formation rate (Hanczyc et al. 2007)
- Effect varies systematically with mineral properties (*charge, surface area*) (Sahai et al. 2017)
- IEP is quantitatively related to mineral crystal structure, dielectric constant (Sverjensky & Sahai, 1997)