

Ligand effects on the oxidative stability of CdSe nanoparticles

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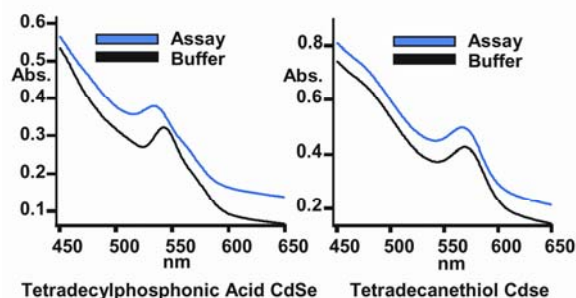
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Headgroup dependent stability of CdSe nanoparticles under environmentally relevant oxidative conditions

Alkyl-functionalized CdSe nanoparticles can be rendered stable in aqueous solutions by wrapping with amphiphilic copolymers[1,2]. However, the stability of the ensemble also depends on the choice of headgroup that binds to the nanoparticle. Here, we use an *in vitro* biomimetic assay to characterize how the choice of ligand headgroup impacts stability under controlled oxidizing conditions[3], using carboxylic acid, phosphonic acid, and thiol headgroups. Our results indicate significant differences in stability according to headgroup, as shown in the figure below.

Figure 1: Headgroup dependent particle degradation.



Discussion of Results

In agreement with prior studies, we find that wrapping nanoparticles with an amphiphilic polymer can enhance particle stability under oxidizing conditions. [2] However, the choice of headgroup on the initial alkyl ligands still has important consequences due to differences in packing density and thermodynamic stability of the surface bonds. Using infrared and x-ray spectroscopies, combined with thermogravimetric analysis allows us to relate differences in stability of polymer-wrapped nanoparticles to the chemical and physical structure of the ligands.

[1] Colvin *et al* (2007) *J. Am. Chem. Soc.* **129**,2871-2879. [2] Smith *et al* (2006), *PCCP* **8**, 3895-3903. [3] Metz *et al.* (2009) *Env.Sci & Tech.* ASAP

Deep sea corals off Brazil verify a reduction of NADW formation during H2, H1 and the YD

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Th/U ages of deep sea corals genus (*Lophelia* and *Solenosmilia*) sampled in sediment cores from two nearby locations off the coast of Brazil at water depths between 600 and 800 m group close to Heinrich events H2, H1 and the Younger Dryas, suggesting that these periods were more favourable for coral growth than conditions during most of the Holocene and Late Glacial. The enhanced productivity of corals may be ascribed to higher amounts of nutrients in surface water transported by a more efficient upwelling of the nutrient richer deep water. The $\Delta^{14}\text{C}$ of the Southern Source Water (SSW) bathing the corals in H2, H1 and the Younger Dryas is up to 400‰ lower than the corresponding atmospheric values. Ventilation ages, partly exceeding 4,000 years together with the higher Cd/Ca ratios are a strong indication for a larger admixture of the SSW due to the reduction of North Atlantic deep water formation during these periods, as earlier deduced from the ratio of $^{231}\text{Pa}/^{230}\text{Th}$ in deep sea sediments.