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Nanometric Sized Ions for Colloidal Stabilization

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Abstract : Ionic species, such as polyoxometalates (POMs) or (metal-) boron clusters, are at the frontier between ions and (charged-)colloids due to their nm size. We show here that the large size and low charge density of POMs, compared to classical ions, are responsible for a peculiar behavior called “super-chaotropy”. This property refers to the strong propensity of nano-ions to adsorb at neutral polar interfaces, via non-specific interactions. It has strong effects on phase transitions in soft matter and can, for example, stabilize colloidal systems such as surfactant foams. A simple way for evaluating and classifying nano-ions, such as POMs, according to their super-chaotropy is proposed here. The super-chaotropic behavior of nano-ions opens many opportunities in separation science, catalysis, and for the design of nanostructured hybrid materials.

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