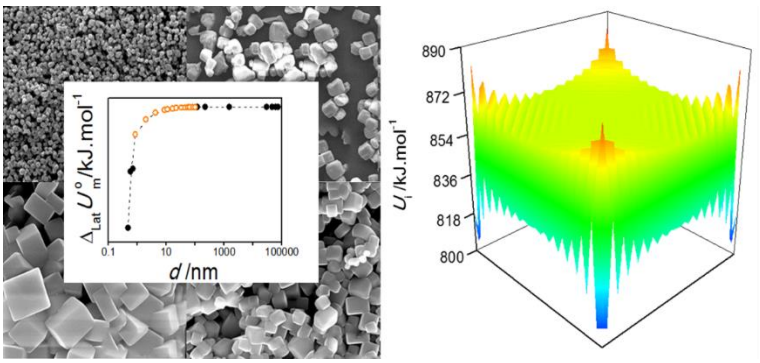
Size Matters: The Stability of NaCl, the Most Abundant Salt on Earth, Considerably Changes on Entering the Nano World



Size Matters: An Experimental and Computational Study of the Influence of Particle Size on the Lattice Energy of NaCl, S. Range, C. E. S. Bernardes, R. G. Simões, M. Epple, M. E. Minas da Piedade, J. Phys. Chem. C, 2015, 119, 4387-4396.

One of the most interesting features of nanomaterials is the change in properties that normally accompanies a decrease in particle size. Using calorimetric experiments and atom-atom pair potential calculations, we were able to show, for the first time, that the stability of sodium chloride, the most abundant salt on earth, considerably decreases (>30%) with the decrease of the crystal size up to the single molecule dimension. The decrease is particularly steep for crystal sizes below ~100 nm. The results further suggested that the cohesive energy within each crystal layer varies from site to site, with the energy differences between adjacent sites decreasing on moving from the periphery to the centre of the crystal. As expected, the atoms at the outmost surface layer exhibit the lowest cohesive energies.