Conformer-specific reactions with Coulomb-crystallized ions

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Different conformations (structural isomers) of typically molecules can exhibit different reactivities, due to differences in "chemical shape" and electronic properties. This provides perspectives to manipulate the outcome of chemical reactions by selecting specific molecular conformations [1,2]. To explore this dependence in bimolecular reactions, we study gas-phase reactive collisions between conformer-selected neutral molecules of 3-aminophenol [1,2] and Coulomb crystals of laser-cooled Ca^+ ions [3]. 3-aminophenol are prototypical complex molecules that exhibit two conformations with distinct permanent electric dipole moments. They can be spatially separated in a molecular beam passing through an electrostatic deflector that creates inhomogeneous electric fields. Coulomb crystals of spatially localized Ca^+ ions in an ion trap provide a suitable stationary target for the present reactive scattering study, due to high sensitivities to a level of single reaction events. We present preliminary experimental results of conformer-specific reaction rates and theoretical calculations.

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