Preliminary studies of isolated nanoparticules relaxation dynamics: Tryptophane and NaCl

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Molecular complexes of close-shell molecules (and even more, rare gas atoms) are often bound by weak forces in the ground state (*e.g.*, van-der-Waals forces) and their components do not react together, at least at room temperature. This is due to the presence of energy barriers along possible reaction coordinates. In the presence of electronic excitation, the shape of the potential energy surfaces changes and new forces appear. They dominate over the van-der-Waals interaction and reactivity can be turned on. The formation of excimers as those observed in excited rare gas pairs may be the first step of such phenomena in condensed matter.[1] This was observed in a recent work of our group where the time-resolved formation of self-trapped exciton was investigated in argon clusters. In this case, the observed phenomenon is of course not a chemical reaction, but simply vibronic relaxation of the energy within the cluster. Its first picosecond evolution was followed after excitation near the ionization threshold.[2]

Here, we investigate potentially more complex phenomena. The relaxation dynamics of isolated nanoparticles in the gas phase is followed in the real-time domain by angularly resolved photoelectron spectroscopy. The sample is introduced into vacuum using an aerodynamic lens coupled to an aerosol generator. In the present preliminary report, several previously reported results of multiphoton ionization and formation of nanoplasma were reproduced.[3] We will present also results on the single photon excitation of such structures and their subsequent relaxation decay. Preliminary studies will be presented on Try and NaCl. We plan to work now on photoswitches.

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