How *ultrathin* alkali-halide films react upon electron irradiation?

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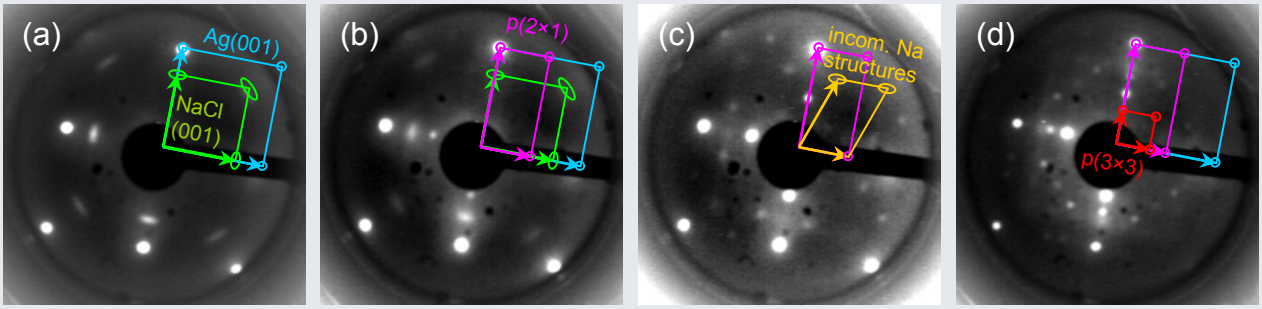
Ultrathin alkali-halide films are increasingly used as spacers to electronically decouple organic molecules from metallic substrates in atomically controlled systems for single molecule spectroscopy measurements; however, their modification upon electron irradiation has never been addressed. In the case of *bulk* alkali-halide crystals, electron irradiation is known to induce layer-by-layer alkali halide desorption, through a mechanism that involves the creation of halogen atom vacancies in the bulk. In the *ultrathin* film case, the limited amount of reactants and the interactions with the substrate are crucial, leading to different reaction kinetics, compared to bulk crystals. The outcomes may be different too, since the products of alkali-halide dissociation may adsorb or even react with the substrate, whereas on bulk crystals the dissociation products inevitably adsorb on the same alkali-halide material.



Using LEED, AES and STM, we have studied the desorption of ultrathin NaCl films grown on Ag(001) upon electron irradiation. LEED and AES were used both to modify the NaCl films and to investigate the reaction kinetics and products. We observe that Na atoms produced from NaCl dissociation diffuse to bare areas of the Ag(001) surface, where they form Na-Ag superstructures that are known for the Na/Ag(001) system. The electron irradiation induces an increasing disorder in the ultrathin NaCl films, which slows down the reaction kinetics; as a result, the reaction kinetics and products depend on the NaCl film thickness. This study is a first step toward the use of electron-irradiated ultrathin alkali-halide films as "templates" for anchoring single organic molecules or producing macromolecular structures on a surface.

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