Summary and Outlook

The present study of the growth behavior of ionic insulators on stepped and kinked metal surfaces revealed a clear and rather general criterion for the interfacial stability between the alkali halide adlayer and the metal substrate. This stability criterion can be exploited to establish the following growth processes:

- **Layer growth** occurs on stepped metal surfaces if there is a lateral matching between the charges of the (100)-terminated ionic adlayer and the charge modulation (i.e. the intrinsic steps) of the substrate.

- **One-dimensional faceting (stripe-like structures)** can occur on stepped metal surfaces if there is a facet orientation close to the macroscopic surface which fulfills the criterion for layer growth. Furthermore, sufficient substrate adatom mobility is necessary to allow for the faceting process.

- **Two-dimensional faceting (pyramidal structures)** can occur on kinked surfaces whose orientation is close to a substrate orientation suitable for one-dimensional faceting. Due to the more complex structure of the evolving surface topography a higher adatom mobility is necessary for this process. The criterion for the enhanced binding of an ionic layer on a charge-modulated substrate is not only applicable to stepped surfaces but also to kinked surfaces.

These facet structures are not only modulated with respect to their topography but also with respect to their surface-chemical behavior: One facet type corresponds to a bare metal facet, while the other facet type(s) is (are) passivated by the chemically inert alkali halide adlayer. For the pyramidal facet structure the chemical selectivity was verified by the selective adsorption of CO on the metal facet only. Furthermore, a new growth behavior was found for the interlayer growth of Ag on the Cu(311) facet with NaCl as surfactant.

The insulating films grown on the metal surfaces could be utilized as a suitable template to build up metallic or molecular nanostructures which are (to a certain extend) electronically decoupled from the substrate. Further interesting aspects concern the faceted surface structures, especially their chemical modulation: They could be used for the nanostructuring of metallic and magnetic materials by means of selective decoration of the reactive metal facet in a subsequent deposition step. Since this approach was not successful yet with Ag as the deposit, other materials could be selected. An alternative approach to realize a selective nucleation of metallic nanostructures could take advantage of the surface topography in the first place: The deposition procedure could be modified and changed from direct deposition to shadow deposition with a grazing incidence geometry for the metal deposition.

One of these approaches could eventually lead to a large-scale array of nanomagnets, one possibility on the way towards ultra-high-density magnetic recording media.