Summary

Organic layered compound crystals have rarely been investigated by means of non-contact atomic force microscopy (nc-AFM). During his PhD thesis at the University of Basel, Dr. Gregor Fessler developed a room temperature (RT) nc-AFM which operates in ultra high vacuum (UHV) conditions to investigate and to analyse this kind of materials [1]. These organic layered compound crystals offer the possibility to design surfaces with different chemical compounds and molecular orientations. The benzylammonium crystal (BNL) is one of these typical organic crystals and is challenging for fundamental AFM studies because it is thought to be a good material to perform molecular adsorption and possesses interesting friction anisotropic as well as magnetic properties.

In this Master thesis the behaviour of fullerene (C_{60}) on BNL was investigated. The C_{60} were deposited on the substrate, imaged and manipulated. High resolution images as well from substrate as from the adsorbates were obtained. The organization of the C_{60} molecules in small islands was studied. These triangular- or hexagonal- shaped islands are formed of less than ten monolayers of C_{60} molecules and are typically 20 to 30 nm wide. Successful tip-induced manipulation of these islands was performed. A favourable displacement direction, probably related to the anisotropic surface of the substrate, was highlighted. Thanks, to the excitation signals, a model for the tip-induced displacement technique was established. Contrary to what was expected, the island was more often attracted by the tip than simply pushed. It was observed that these islands can be split and redistributed to the neighbouring islands or collision and fusion with other islands to form a single bigger island. Tip-induced shape modification of one of these C_{60} islands was also observed and analysed. The molecules of the edges from one triangular island can travel to its top to form a more stable hexagonal island.