Ion tracks on LiF and CaF_2 single crystals characterized by scanning force microscopy

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This work presents results of scanning force microscopy (SFM) of tracks induced by energetic heavy ions on the surface of LiF and CaF_2 single crystals. The samples have been irradiated at normal incidence with several ion species with kinetic energies in the range from several hundred MeV to some GeV. The analysis of the SFM micrographs provides the mean diameters and heights of tiny hillocks created by ion impact. In the case of LiF, a previously published data set of the diameters and heights as a function of energy loss has been extended.

Furthermore, the topographic height distribution of an image containing numerous tracks is analyzed by plotting a grey-value histogram of the complete image. Fitting a Gaussian function to each of the two peaks of this distribution allows us to determine the relative surface coverage with ion tracks. Displaying the relative area covered with tracks versus increasing fluence results in an exponential saturation curve containing an average track diameter. This procedure examines the consistency of the different mean diameters extracted from the series of single SFM images underlying the data set presented here.