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ION-BEAM ETCHING OF RAMPS IN THIN FILM HETEROSTRUCTURES

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Ion-beam patterning of thin films and heterostructures is one of the most common processes of fabrication of thin film devices and structures. "Directed" nature of ion-beam etching provides a possibility to form certain profiles on the films surface, like shallow ramps, when etching is performed at some inclination angle. A simple geometrical model is presented, describing the formation of a ramp as a shadow of the mask on the film surface. Good agreement with the experiment can be obtained if the mask etching is taken into account. The etching at the opposite direction ("high-angle etching") also can be satisfactory described by the model. The profile of the slope - positive or negative curvature, pits near the end of the ramp - is discussed as a function of the etch rate dependence on the incidence angle. Such etch rate dependences for some often used materials were measured. An area of instability of the resulting ramp shape is found for the "high-angle etching". The model is compared with the experimental data reported by other groups. Finally ion-beam etching of a rotating sample at non-normal incidence is discussed, the results are compared with experimental data.

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