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Steering effect on the growth of thin films

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Recently, van Dijken et al. report the growth of rectangular Cu islands on square-symmetric Cu(001) when the deposition is made at grazing incidence.[1] Furthermore, they control the shape of Co island on Cu(001) by varying the deposition angle and successfully manipulate its magnetic anisotropy.[2] Their work clearly reveals the importance of dynamic variable and expands the adjustable parameters for the growth of thin film.

In the present talk, we present an atomistic picture for the steering effect on thin film growth obtained by performing a realistic simulation combining KMC and MD simulations.[3] Through the simulation, the asymmetric island shape observed in the experimental study[1] is well reproduced without invoking any fitting parameters. The asymmetric shape of the island is attributed mainly to the asymmetric deposition flux on the lower terrace of island that, in turn, depends on its size. Moreover, a salient phenomenon, the reversal of the asymmetry of island from elongation along the deposition direction to along the direction perpendicular to the deposition direction. Finally, we discuss the implication of the steering effect on thin film growth under various growth environments.

[References]

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