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Universal non-equilibrium phenomena at submicrometric surfaces and interfaces

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Abstract- The recent widespread interest in processes occurring at micro and nanometric scales has increased the physical relevance of the surfaces and interfaces constituting system boundaries, both at and far from equilibrium. In the latter case, universal properties occur, such as scale invariance (surface kinetic roughening), surface pattern formation or domain coarsening. However, descriptions of these systems feature limited predictive power when based merely on universality principles. We review examples from Materials Science at nano and submicrometric scales, that underlie the importance of describing growing surfaces by means of (phenomenological) constitutive laws, in order to correctly describe the rich behaviors experimentally found across many different systems. Additionally, this approach provides new generic models that are also of interest in the wider contexts of Pattern Formation and Non-Linear Science.

Index Terms- chemical-vapor-deposition, thin-film growth, ion-sputtered surfaces, aeolian sand ripples, vicinal surfaces, morphological instabilities, nonlinear evolution, dynamics, model, equation

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