Structures of mechanical equilibrium might be unpredictable. The structures of thin film crystals, nevertheless, may be treatable.

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Many structure prediction problems (protein folding, geometry of atomics or molecular clusters, bulk crystals, surface induced structures) are usually formulated in terms of energy minimization problems. I present theoretical and empirical evidence showing that these minimization problems may be, after all, much more difficult than we normally think.

These difficulties, however, do not necessarily impair our ability to simulate the growth of thin films adsorbed on substrates. Non-equilibrium problems might, in very fortunate cases, be easier than equilibrium problems.