

1058-74-37

**Mihaela Blanariu\*** (mblanariu@colum.edu), 623 S. Wabash Ave., room 224, Chicago, IL 60605-1996, and **B J Spencer**. *Asymptotic Analysis of the Shape and Composition of Alloy Islands in Epitaxial Solid Films*.

We consider the formation of solid drops (“islands”) occurring in the growth of strained solid films. Beginning from a detailed model for the growth of an alloy film that incorporates the coupling between composition, elastic stress and the morphology of the free boundary, we develop an asymptotic description of the shape and compositional non-uniformity of small alloy islands grown at small deposition rates. A key feature of the analysis is a “thin domain” scaling in the island which enables recasting the free boundary problem into a set of integrodifferential equations for the shape and composition profile. The system can be decomposed into two parts: one part gives a single integrodifferential equation for the shape analogous to that obtained for a single-component island determined by Shanahan and Spencer (2002), and the other part gives the composition profile in terms of the shape. The shape of an alloy island is identical to that of a single-component island with the same system parameters, but with a non-uniform composition that depends on the stress-composition coupling and alloy solution thermodynamics. We describe the structure and magnitude of the compositional non-uniformity and interpret our theoretical results in the context of SiGe films. (Received January 11, 2010)