

s3.m12.02 **Growth of Metal Films on Quasicrystals.** Patricia A. Thiel, Ames Laboratory, and Departments of Chemistry and Materials Science & Engineering, Iowa State University, Ames, IA 50011 USA. E-mail: thiel@ameslab.gov

Keywords: Quasicrystal; Film; Surface

Quasicrystals are metallic alloys in which the atoms exhibit a remarkable arrangement: They are well-ordered, but not in a periodic fashion. Even more interesting, these materials exhibit unusual combinations of physical properties—apparently linked to their atomic structure. The opportunity to use these materials as templates for growth is the topic of this talk. Specifically, we have studied metals deposited on quasicrystalline substrates in order to derive fundamental physical insights into the processes and energetics involved in formation of an aperiodic-periodic interface. In this talk, I will provide examples of three main types of information, which can be obtained from different coverage (thickness) regimes. With increasing coverage, they are: (i) nucleation; (ii) growth modes, reflecting surface and interface energies; and (iii) crystallographic orientations—specifically, relationships between high-symmetry zone axes of the quasicrystal and the thick crystalline film. To derive these types of information, we have measured film structures of Ag and Al, as probe metals, on a number of different substrates, including Al(111), the ξ' Al-Pd-Mn approximant, the fivefold surface of icosahedral Al-Pd-Mn, the fivefold surface of icosahedral Al-Pd-Mn, and the tenfold surface of decagonal Al-Ni-Co. Our observations include site-specific “heterogeneous” nucleation on the fivefold quasicrystalline surfaces; strong differences in growth modes for film-surface couples that are chemically similar; and interfacial crystallographic alignments that are different than those reported commonly for confined (bulk) interfaces. Where possible, comparisons are made between these observations, and those typical of single-element metal homoepitaxy. We will also review achievements from other laboratories on this topic.

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s3.m12.03 **Crystallographic Defects in Approximants of Quasicrystals.** V. Demange^a and J.M. Dubois^b, ^aLaboratoire de Science et Génie des Surfaces, UMR CNRS 7570, Ecole des Mines, Parc de Saurupt, F-54042 Nancy Cedex, France, ^bLaboratoire de Science et Génie des Matériaux et de Métallurgie, UMR CNRS 7584, Ecole des Mines, Parc de Saurupt, F-54042 Nancy Cedex, France. E-mail: valerie.demange@mines.inpl-nancy.fr

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Quasicrystals are often surrounded by so-called approximant crystals, which exhibit a very similar local order than the quasicrystal itself, yet showing also periodicity. Approximants represent a class of highly complex intermetallic compounds, whose crystal structure is based on giant unit-cells containing up to hundreds or even thousands of atoms. Such a kind of structurally complex alloy phases exists in several systems consisting of two, three or more components. Local order in such phases is different than in simple crystals. The unit cells have a substructure based on polyhedral atom arrangements or clusters that partially overlap or are linked by bridging elements. Due to their large unit cell, approximants offer an interest from point of view of crystallographic defects. During this talk, we will present in details some complex structures, as for example, approximants chosen in the Al-Cr-Fe system. Some results on defects studies by transmission electron microscopy of selected complex intermetallics will also be discussed.