Abstract Submitted
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AuSi Eutectic Dynamic and Meso-Pyramid Formation[1] NATHAN DICE, Oklahoma State University — Novel mesoscopic pyramid-like structures are produced on silicon [100] substrates by depositing thin films of gold and silicon and annealing in vacuum. Eutectic dynamics provides the theoretical framework whereby on can understand the fundamental principles governing their formation. Cross-sectional Scanning Electron Microscopy (SEM) and Energy Dispersive Spectroscopy (EDS) are used to identify the sequence of steps from a continuous thin film to mesoscopic Au pyramids. The temperature dependence of the pyramid's elemental composition is correlated with the Au-Si eutectic binary phase diagram, where it is found that the process follows boundary between phases that lead to the composition associated with the lowest melting point of the Au-Si eutectic. A dealloying process explains the bulk and surface morphologies of the Au pyramids. In the case of the bulk, voids form within the pyramid, creating a sponge-like morphology. The surface morphology consists of chevrons of plateaus troughs. Our understanding of the eutectic dynamics creates new opportunities in non-linear optics, as well as Surfaced Enhanced Raman Scattering (SERS) sensors.

[1]Office of Naval Research

Nathan Dice
Oklahoma State University-Stillwater

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