

Phase Transitions and Instabilities at Fluid Metal/Vapour Interfaces

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Fluid metals are rich in interfacial phenomena such as complete wetting transitions, surface freezing phenomena, or interfacial oscillatory instabilities (capillary-gravitational instabilities). Some of these phenomena have been observed and characterized only recently by employing surface sensitive probes such as X-ray reflectivity and grazing incidence X-ray diffraction, second harmonic generation (SHG), spectroscopic ellipsometry and XPS, and Auger spectroscopy. In this contribution we will focus on some recent results from our group on Ga-based fluid alloys (Ga-Bi, Ga-Pb, and Ga-Tl). The topics addressed include:

- α) Complete wetting transitions in Ga-Bi alloys approaching the liquid-liquid coexistence curve; in particular, variation of wetting film thickness with the distance from the coexistence curve;
- β) Periodic variation of the wetting film thickness inside the miscibility gap and its correlation with bulk temperature oscillations; comparison of experimental results with model calculations;
- γ) Surface freezing transitions in Ga-based alloys; characterization of surface freezing films by XPS and STM.

The general problem of the correlation of bulk and interfacial phase transitions will be discussed.