Solids, Liquids and What's Between Them

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Understanding the nature of solid-liquid interfaces in various materials systems is very important for many processes of technological interest, such as solidification, epitaxial growth, wetting, liquid phase joining, crystal growth, and lubrication. In recent years, many published works report on interesting structural effects occurring at solid-liquid interfaces, such as ordering in a liquid adjacent to a solid.

High resolution transmission electron microscopy (HRTEM) is known to be a very powerful tool for the study of materials at the atomic scale, and is an apparently direct method to quantitatively study internal surfaces (interfaces). The main problem with direct HRTEM investigations is that the microscope operating parameters have a significant influence on the contrast in the image, and may lead to inaccurate conclusions regarding the structure of the investigated material. This problem can be solved via the combination of dynamic electron scattering simulations using atomic positions from molecular dynamics simulations.

In this talk I will present an ongoing study showing the ordering effect at an Al-Al₂O₃ liquid-solid interface by combining quantitative in-situ HRTEM heating experiments with computer simulations.