

## **Anisotropy in Wetting of Oriented Sapphire Surfaces by Liquid Al-Cu Alloys**

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The coexistence of a liquid with a solid and a gas phase causes a contact angle at the triple line and results in a work of adhesion. These properties were studied for liquid Al, Cu, and their alloys on single crystalline sapphire surfaces, with C(0001)-, A(11-20)-, and R(1-102)- orientation. Measurements were performed at 1100°C and 300 mbar Ar atmosphere in a recently built sessile drop apparatus. In this machine the sample is heated and molten separately from the substrate within a drop dispenser. As soon as the measurement conditions are reached, the liquid metal is pressed out of it. Depending on the alloy composition, the contact angle approaches a constant value within few minutes after the droplet has been brought in contact with the substrate: In the case of pure Cu the contact angle increases to a non-wetting equilibrium value, i.e.  $>90^\circ$ , which is identical for each kind of wetted sapphire surface. For pure Al, an anisotropy of the contact angle with regard to these surfaces is found: time evolution of the Al contact angle is only observed for wetting of C-surfaces. Wetting of A- and R-surfaces shows no pronounced time dependence. In these cases, a smaller contact angle of about  $90^\circ$  is observed. Wetting of the different sapphire surfaces by Al-Cu alloys corresponds qualitatively to their wetting by pure Al: again, only for C-surfaces a time-dependent increase of the contact angle is observed. On A- and R-surfaces wetting is not time-dependent and the contact angle increases with Cu content of the alloy. This behavior is discussed with respect to oxygen partial pressure, surface reconstructions of sapphire and adsorption of Al in the interfaces. By combining surface tension data measured in electromagnetic levitation with the contact angles, works of adhesion are also considered.