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Lithium wetting of stainless steel for plasma facing components[1]
C.H. SKINNER, A.M. CAPECE, PPPL, J.P. ROSZELL, B.E. KOEL, Princeton University — Ensuring continuous wetting of a solid container by the liquid metal is a critical issue in the design of liquid metal plasma facing components foreseen for NSTX-U and FNSF. Ultrathin wetting layers may form on metallic surfaces under ultrahigh vacuum (UHV) conditions if material reservoirs are present from which spreading and wetting can start. The combined scanning electron microscopy (SEM), Auger electron spectroscopy (AES) and ion beam etching capabilities of a Scanning Auger Microprobe (SAM) have been used to study the spreading of lithium films on stainless steel substrates. A small (mm-scale) amount of metallic lithium was applied to a stainless steel surface in an argon glove box and transferred to the SAM. Native impurities on the stainless steel and lithium surfaces were removed by Ar+ ion sputtering. Elemental mapping of Li and Li-O showed that surface diffusion of Li had taken place at room temperature, well below the 181°C Li melting temperature. The influence of temperature and surface oxidation on the rate of Li spreading on stainless steel will be reported.

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C.H. Skinner
PPPL

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