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Probing the ^{3}He distribution in coexisting liquid and solid ^{4}He[1]
ZHIGANG CHENG, JOHN BEAMISH, University of Alberta — Substantial attention has been focused on recent experiments of ^{4}He mass flow across solid-liquid interfaces and within completely solid samples. The flow is suppressed by ^{3}He impurities and appears to involve superfluid pathways: microscopically thin superfluid layers, dislocations with superfluid cores allowing superclimb, or both. It is clear that ^{3}He accumulates in the liquid ^{4}He and on solid-liquid interfaces, depleting the ^{3}He concentration in the solid at low temperature. Here we report a preliminary study of the ^{3}He concentration in the liquid phase of solid-liquid coexisting samples. By measuring the capacitance between two concentric cylinders immersed in the liquid helium, we are able to detect movement of ^{3}He between the solid and liquid phases, thanks to the dependence of the dielectric constant on ^{3}He concentration. We measure the migration of ^{3}He into the liquid at low temperatures and find that the time constant for the concentrations to equilibrate is longer at lower temperature.

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