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Two level tunneling states in amorphous germanium thin films¹

THOMAS METCALF, XIAO LIU, Naval Research Lab Code 7130, GLENN JERNIGAN, Naval Research Lab Code 6182, MATTHEW ABERNATHY, NRC Postdoctoral Associate, Washington DC — In light of our recent work creating amorphous silicon (a-Si) thin films without the universal two-level tunneling states (TLS) that are found in every other amorphous solid that has been studied to date, the question arises whether it is possible to create other amorphous solids without TLS. To this end, we have measured the low-temperature internal friction of several amorphous germanium (a-Ge) films. Here we report preliminary measurements on a sequence of a-Ge films grown at different substrate temperatures. As with a-Si, we find a systematic decrease in TLS with increasing substrate growth temperature, and have observed an order-of-magnitude decrease in tunneling strength for a-Ge grown at 160°C. We address the question of whether the crystallization kinetics of a-Ge will permit the creation of a fully amorphous yet TLS-free film.

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