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Title:	Temperature-Dependent Nonlinear Damping in Palladium Nanomechanical Resonators.
Authors:	Kumar, Shelender (/jspui/browse?type=author&value=Kumar%2C+Shelender) Rebari, Shishram (/jspui/browse?type=author&value=Rebari%2C+Shishram) Pal, Satyendra Prakash (/jspui/browse?type=author&value=Pal%2C+Satyendra+Prakash) Yadav, Shyam Sundar (/jspui/browse?type=author&value=Yadav%2C+Shyam+Sundar) Kumar, Abhishek (/jspui/browse?type=author&value=Kumar%2C+Abhishek) Aggarwal, Aaveg (/jspui/browse?type=author&value=Aggarwal%2C+Aaveg) Indrajeet, Sagar (/jspui/browse?type=author&value=Indrajeet%2C+Sagar) Venkatesan, Ananth (/jspui/browse?type=author&value=Venkatesan%2C+Ananth)
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Abstract:	Advances in nanofabrication techniques have made it feasible to observe damping phenomena beyond the linear regime in nanomechanical systems. In this work, we report cubic nonlinear damping in palladium nanomechanical resonators. Nanoscale palladium beams exposed to a H2 atmosphere become softer and display enhanced Duffing nonlinearity as well as nonlinear damping at ultralow temperatures. The damping is highest at the lowest temperatures of ~110 mK and decreases when warmed up to ~1 K. We experimentally demonstrate for the first time temperature-dependent nonlinear damping in a nanomechanical system below 1 K. This is consistent with a predicted two-phonon-mediated nonlinear Akhiezer scenario with a ballistic phonon mean free path comparable to the beam thickness. This opens up new possibilities to engineer nonlinear phenomena at low temperatures.
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