Title:	Tunable low-temperature dissipation scenarios in palladium nanomechanical resonators
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Keywords:	Tunable low-temperature nanomechanical two-level systems (TLS)
Issue Date:	2017
Publisher:	APS
Citation:	Physical Review B, 95 (21)
Abstract:	We study dissipation in palladium (Pd) nanomechanical resonators at low temperatures in the linear response regime. Metallic resonators have shown characteristic features of dissipation due to tunneling two-level systems (TLS). The system described here offers a unique tunability of the dissipation scenario by adsorbing hydrogen (H2), which induces a compressive stress. The intrinsic stress is expected to alter TLS behavior. We find a sublinear ~T0.4 dependence of dissipation in a limited temperature regime. As seen in TLS dissipation scenarios, we find a logarithmic increase of frequency from the lowest temperatures till a characteristic temperature Tco is reached. In samples without H2,Tco~1K was seen, whereas with H2 it is clearly reduced to ~700mK. Based on standard TLS phenomena, we attribute this to enhanced phonon-TLS coupling in samples with compressive strain. We also find that with H2 there is a saturation in low-temperature dissipation, which may possibly be due to super-radiant interaction between TLS and phonons. We discuss the data in the scope of TLS phenomena and similar data for other systems.
Description:	Only IISERM authors are available in the record.
URI:	https://journals.aps.org/prb/abstract/10.1103/PhysRevB.95.214113 (https://journals.aps.org/prb/abstract/10.1103/PhysRevB.95.214113) http://hdl.handle.net/123456789/1969 (http://hdl.handle.net/123456789/1969)
Appears in Collections:	Research Articles (/jspui/handle/123456789/9)

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