Superconductor-Insulator Transition in Amorphous Nb_xSi_{1-x} Thin Films. Comparison between Thickness, Density of States and Microscopic Disorder effects.

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We report on the study of the Disordered-induced Superconductor-Insulator Transition (DSIT) in Nb_xSi_{1-x} thin films. These films, synthesized by electron-beam co-deposition, are continuous, amorphous, homogeneously disordered and structurally stable for a wide range of compositions, thicknesses and annealing temperatures and thus particularly well suited for the study of DSIT.
We present an analysis of the DSIT induced by three different parameters: the thickness, the Nb composition that changes the electronic density of states and the annealing temperature that changes the microscopic disorder. The annealing changes quantum interference patterns that decreases the local conductance. Our results show that the effect of the thickness on the destruction of superconductivity is very distinct from those of the composition or the annealing. We point out this material is particularly interesting to disentangle the effect of the parameters driving this quantum phase transition.