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Effect of uniaxial structural anisotropy of Al/Nb metamaterial on the superconducting transition temperature and magnetic response

Here, we have designed a metal/superconductor (Al/Nb) metamaterial to modulate its superconducting transition temperature Tc and response to external magnetic fields (Ha). The coherence length of the Cooper pairs of bulk Nb regulates the thickness of the Nb and Al layers; thus, the filling factor [fNb = dNb/(dNb + dAl)] of the metamaterial was set to 0.88 and 0.12, which were contrasted to a thick Nb layer, fNb = 1. Curves of magnetic moment vs. temperature allow observing the effect of anisotropy. The behavior of Tc and response of the metamaterial to the Ha is discussed in terms of uniaxial structural anisotropy and proximity effect.

Keywords

hyperbolic metamaterial geometry, structural uniaxial anisotropy, Al/Nb multilayers, superconductivity.

Reference

This abstract has no references

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Author approval

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