

Time-Resolved Optical Characterization of Proximized Nano-Bilayers for Ultrafast Photodetector Applications

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Abstract - Time-resolved transient pump-probe spectroscopy measurements on proximized ferromagnet/superconductor (F/S) structures are presented. We focused our attention on both low and high critical temperature superconductors such as Nb and YBCO, while for F the weak-ferromagnetic alloy $\text{Ni}_{0.48}\text{Cu}_{0.52}$ has been used. Dynamics of the electron-phonon relaxation process has been investigated as a function of both the temperature and the F-film thickness. In the case of NiCu/Nb bilayers a thin F overlayer reduces the bolometric component of the photoresponse, while in YBCO structures with NiCu faster relaxation times were measured. F/S nanobilayers are very attractive for the development of novel hybrid superconducting photodetectors.

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