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Anomalous Proximity Effect Nb/Al/CoFe(Ni, $Cu_{40}Ni_{60}$) trilayers JUN HYUNG KWON, JINHO KIM, KYUNGMOON KIM, KOOKRIN CHAR, Center for Strongly Correlated Materials Research, School of Physics, Seoul National University, Seoul, Republic of Korea, HYEONJIN DOH, HAN-YONG CHOI, Department of Physics, Sung Kyun Kwan University, Suwon, Republic of Korea
— We have fabricated Nb/Al/CoFe(Ni, $Cu_{40}Ni_{60}$) trilayers to study the difference from proximity effect of Superconductor/Ferromagnet bilayers. Increasing the thickness of Al in S/N/F trilayer, we observed that Tc value of S/N/F trilayers increase sharply almost to the Tc of S/N bilayer until the Al thickness of 3nm. As Al thickness increases from 3nm to 180nm, Tc value of S/N/F decreases again, following those of the S/N data. Although trilayers have different initial Tc due to different exchange energy(CoFe, Ni, $Cu_{40}Ni_{60}$) when Al thickness is 0nm, the Tc of S/N/F trilayers become almost same when Al thickness is 3nm. In order to fit the Tc data of Nb/Al/CoFe trilayers as a function of Al thickness, we had to use a large $\gamma_b^F (= R_b A/\rho_f \xi_f)$ value of about 4. Increasing the thickness of ferromagnet in S/N/F Trilayer, we observed minimum Tc value and the difference in dip position depending on the ferromagnetic materials. In each case, however, each dip position was almost same as in the S/F bilayers although the magnitudes of the dip structures were smaller. We will discuss the implication of our findings of large boundary resistances and the possibility of triplet superconductivity.

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