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Co-existence of ferromagnetism and superconductivity in Ni/Bi bilayers PATRICK LECLAIR, JAGADEESH MOODERA, MIT, DON HEIMAN, Northeastern Univ., JOHN PHILIP, MIT — Thin films of Bi on ultra-thin Ni seed layers (2-15ML) exhibit a novel superconducting (SC) phase, with the ferromagnetism (FM) of Ni quenched for < 2nm. We have prepared $Al/Al_2O_3/Ni/Bi$ tunnel junctions with varying Ni thicknesses to study the competition between FM and SC. We unambiguously demonstrate that by tuning Ni thickness, the competition between FM and SC in Ni/Bi can be tailored. For narrow range of Ni thickness, the coexistence of a SC energy gap and conduction electron spin polarization are visible on the Ni side of the Ni/Bi bilayers is directly observed. We believe this represents one of the clearest observations of SC and FM coexisting. We have also performed extensive structural and electrical characterization of the Bi. Hall and resistivity measurements show a much higher carrier concentration and lower mobility compared to bulk Bi, and metallic R(T) behavior. These facts support the idea that an increased DOS at the Fermi level in this structure of Bi is responsible for the observed superconductivity. Supported by NSF grants.

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