

Abstract Submitted  
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**Nanoscale magnetic tunnel junctions** KIRILL BOLOTIN, ABHAY PASUPATHY, FERDINAND KEUMMETH, DANIEL C. RALPH, Cornell University — We describe measurements of nm-sized ferromagnetic Ni and permalloy tunnel junctions. Electromigration is used to form a gap between the electrodes ranging in width from zero to several nanometers. Thus both the metallic-point-contact and tunneling regimes can be accessed. The source and drain electrodes are shaped differently to give them different coercive fields, so that the relative direction of their magnetic moments can be controlled by an external magnetic field. Magnetoresistances of 10-20 % are observed for most tunnel junctions, comparable to Julliere estimates. The magnetoresistance is bias-dependent but does not vanish until hundreds of millivolts, indicating a high quality of the vacuum tunnel barrier. In some junctions we observe values of magnetoresistance larger than the Julliere value and of different sign. We have also incorporated a nonmagnetic metal island into the junction to form a F/N/F single-electron transistor. We will report the dependence of tunneling via single quantum states on the relative direction of electrode magnetizations.

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