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Random Telegraph Noise in Silicon Nanowire BioFETs NITIN RAJAN, Yale University, DAVID ROUTENBERG, Scripps Research Institute, JIN CHEN, Stanford University, MARK REED, Yale University — Noise spectroscopy is important for nanostructures because it represents a highly sensitive and non-destructive means of studying surface states/defects. In this study we characterize the low frequency noise of top-down fabricated silicon nanowire FETs with exposed channels at low temperature. For some devices, we observe a change in the noise spectra as temperature is lowered, from 1/f to Lorentzian. This indicates the presence of random telegraph signals (RTS) due to an interface trap which we confirm from the time-domain measurements. By making measurements at different temperatures, we can probe into the dynamic properties of the trap. In this way, the activation energies for the emission and capture of electrons are determined. The nature and position of the trap is deduced from the gate voltage dependence of the emission and capture time constants. We also observe an increase in the relative RTS noise amplitude as temperature is decreased and report on very large (>100%) relative noise amplitudes for measurements carried out at low temperature.

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