Abstract Submitted
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Influence of surface and interface properties on the electrical conductivity of silicon nanomembranes[1] X-F. ZHAO, S. SCOTT, M. HUANG, W. PENG, D. SAVAGE, M. ERIKSSON, M. LAGALLY — We investigate the electronic transport properties of silicon nanomembranes (SiNMs) on oxide by the van der Pauw method. SiNMs, thin sheets of single-crystal Si, feature an extreme sensitivity of electronic transport properties to surface and interface condition, because of the large surface-to-volume ratio. Removing the top oxide with HF reduces the sheet resistance four orders of magnitude for the thinnest NMs (∼20nm) [1], a value much greater than can be accounted for by simply reducing interface traps. We compare SiNMs prepared with HF to H terminations prepared via CVD, to identify which factors control this change in conductivity. We also perform a forming gas (5% H_2 in N_2) anneal on oxidized NMs. The sheet resistance drops relative to unannealed NMs, demonstrating the influence of states at Si/SiO_2 interfaces. A qualitative model that includes these several factors influencing the sheet resistance is described.

[1] Scott S. *et al*, ACS Nano 3 (2009) 1683.

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