

Abstract Submitted  
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**Van der Pauw and Hall Measurements on Ultra Thin Silicon-on-Insulator**<sup>1</sup> WEINA PENG, HONGQUAN JIANG, SANGKEUN HA, MADHU THALAKULAM, DONALD SAVAGE, MARK ERIKSSON, MAX LAGALLY, University of Wisconsin Madison — Ultra-thin silicon-on-insulator (UTSOI) provides opportunities to study the role of the surface in electrical transport in Si. Because the Si layers can be as thin as 10 nm, surface states, surface induced band bending, and gap states at the oxide-Si interface dominate the carrier density. Transport measurements provide a sensitive probe of the carriers. Previous measurements of thin Si structures have shown that Si/SiO<sub>2</sub> interface traps deplete Si of mobile carriers, and sheet resistances reach 10<sup>11</sup> ohm/sq for a 20 nm thick sample [1]. Thus, any perturbation to the surface that induces even modest carrier densities can be detected in transport. We perform van der Pauw and Hall measurements on UTSOI structures with a variety of surface modifications, including hydrogen termination and epichlorohydrin surface attachment. UTSOI that was extremely resistive with oxide on both sides undergoes a drop in resistance of more than 3 orders of magnitude after surface modification. Hall and van der Pauw measurements, reveal the density and the sign of the carriers. We discuss the mechanisms for this increased conductivity. [1] Zhang P. et al. *Nature* **439** 703 (2006)

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