

Abstract Submitted  
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**Spin injection into Silicon using  $\text{Al}_2\text{O}_3$ ,  $\text{SiO}_2$  and MgO tunnel barriers** OLAF VAN T ERVE, CONNIE LI, AUBREY HANBICKI, GEORGE KIOSEOGLOU, BEREND JONKER, Naval Research Laboratory — We recently demonstrated injection of spin-polarized electrons from an Fe film into Si.<sup>1</sup> The tunnel barrier is the key component in achieving a large spin accumulation in the semiconductor. Here we will compare three different tunnel barriers,  $\text{Al}_2\text{O}_3$ ,  $\text{SiO}_2$  and MgO, on highly doped Si using three terminal Hanle measurements. Hanle measurements give insight in the spin-accumulation directly underneath the spin injecting contact. We will compare temperature dependence and bias dependence as well as the tunnel barrier properties such as density of interface states based on I-V and C-V measurements. We will compare spin-injection properties, such as spin lifetimes and spin injection efficiency with the oxide/Silicon interface. A spin lifetime of 120ps was obtained for  $3 \times 10^{19}$  n-doped Silicon for both the  $\text{Al}_2\text{O}_3$  and  $\text{SiO}_2$  tunnel barrier, indicating that the spin accumulation occurs in the Si rather than in surface states. Support by ONR.

<sup>1</sup>B. T. Jonker et al., Nature Phys. 3, 542 (2007), O.M.J. van 't Erve et al., App. Phys. Lett. 91, 212109, (2007)

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