THERMAL SiO_2 GROWTH RATE ENHANCEMENT AT LOW TEMPERATURES USING AN NF_3 ADDITIVE

R.D. Rettmann, R.G. Manley and K.D. Hirschman*, Department of Microelectronic Engineering, Rochester Institute of Technology, *rdr6878@rit.edu* , *kdhemc@rit.edu*

Thermal oxidation of silicon using an NF_3 ambient gas was investigated at low temperature regimes for use in a new thin-film transistor (TFT) technology. The introduction of a viable thermal oxide process could remedy several current challenges facing high-mobility TFT applications. A horizontal hot-walled furnace system was modified with an external torch for the introduction of dilute NF_3 as a source of fluorine. Oxidation tests were performed on 4" bulk Si substrates, and measurements were performed using a Tencor SM300 SpectraMap, verified with a Wollam VASE ellipsometer. The dielectric quality of the SiO_2 films were evaluated using C-V measurements on fabricated Al capacitors. Initial 600°C experiments showed inconsistent and non-uniform results; further tests were shifted to higher temperatures. Experiments done at 700-800°C showed a maximum growth rate enhancement of nearly 300% at 8 sccm NF_3 flow, 7.5 lpm O_2 flow, with an ambient "preheat" through the torch at 800°C. Additional investigations using improved gas injection schemes and increased NF_3 flow are expected to enhance growth rates even further, and at lower temperatures.