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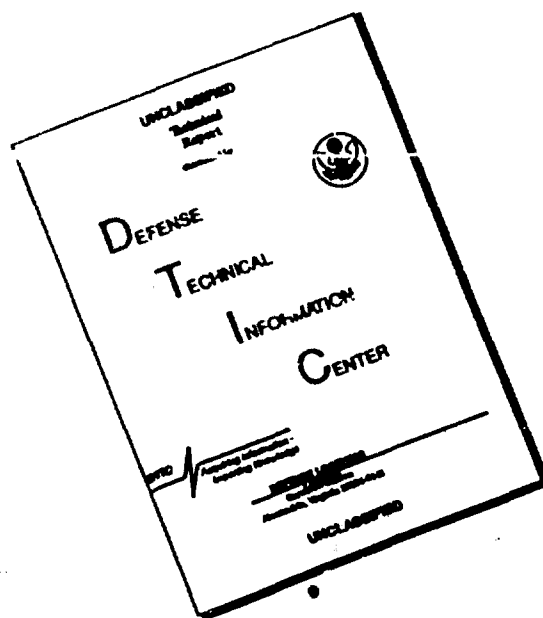
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FINAL REPORT

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CHEMICAL PROCESSES IN SILICON AND INSULATOR GROWTH

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March 1, 1987

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Accomplishments and Conclusions

Below are summarized the significant findings of research carried out under the contract.

- High temperature annealing of SiO_2/Si structures in oxygen-deficient ambients initiates interfacial decomposition of oxide, leading to electrical activation of existing inactive defects.
- Addition of trace oxygen to the annealing ambient prevents formation of electrical defects.
- Metal impurities initiate the SiO_2/Si interfacial decomposition reaction.
- Positron annihilation depth profiling is sensitive to defect structures in thermal oxides, possibly associated with intrinsic defect generation which occurs during the thermal oxidation process.
- An advanced ultrahigh-vacuum-based multichamber processing and analysis system for CVD and oxidation studies has been designed, fabricated, and demonstrated.
- The reaction product for selective W CVD on Si using WF_6 is SiF_4 at low temperature and increasingly SiF_2 at higher temperature.
- Si diffusion through CVD-grown W can sustain the WF_6 reduction reaction.
- Improved techniques for molecular beam studies of CVD surface reactions have been developed.

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