

AD-A237 758



EPITAXIAL GROWTH OF SINGLE CRYSTAL DIAMOND ON SILICON

Contract No. N00014-91-C-0101

Period of Performance: May 15, 1991 to November 14, 1991

Research Supported by

STRATEGIC DEFENSE INITIATIVE/INNOVATIVE SCIENCE AND TECHNOLOGY

Managed by

OFFICE OF NAVAL RESEARCH

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PROGRESS REPORT #1

Reporting Period: May 15, 1991 to June 14, 1991

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SUMMARY OF PREVIOUS PROGRESS

Start of contract.

SUMMARY OF RECENT PROGRESS

Very little progress has occurred on this project because of delays in receiving a signed contract. AFR sent a signed contract to ONR on 20 May, 1991, but the signed duplicate did not arrive from ONR until 10 June, 1991. Work could not commence until that time.

Much of the equipment needed for this research is ready for work to begin. The oxyacetylene torch for diamond CVD is currently operating and available. Although another project is actively employing the spin etch system and the pulsed laser system for depositing high temperature superconductors, the spin etch system is available immediately and the laser system is available on demand in about a month.

Work on the conversion of the plasma reactor to an ultraclean, hot filament CVD reactor has begun. The ultraclean system is designed and most of the parts are on order including a new chamber, resin purifiers, and new mass flow controllers.

FUTURE WORK (through July 14)

- Order remaining equipment for the hot filament reactor and assemble.
- Choose off axis directions for the polished silicon wafers and order.
- Deposit diamond films on spin etched Si(100) using the torch reactor. Explore the effects of scratching and deposition conditions.
- Perform Raman and SEM analyses on torch deposited films.

Tentative schedule for rest of contract.

FUTURE WORK (through August 14)

- Prepare SiC buffer layers on various on-axis and off-axis Si wafers using the hot filament reactor.
- Deposit thicker diamond layers on the buffered wafers using the hot filament and torch reactors.
- Perform Raman, SEM, attenuated total reflectance (ATR), and X-ray analyses on deposited films.

FUTURE WORK (through September 14)

- Prepare SiC buffer layers on various on-axis and off-axis Si wafers using pulsed laser deposition (PLD) of SiC and graphite.
- Deposit thicker diamond layers on the buffered wafers using the hot filament and torch reactors.
- Perform Raman, SEM, ATR, and X-ray analyses on deposited films.

FUTURE WORK (through November 14)

- If necessary prepared c-BN buffer layers on various on-axis and off-axis Si wafers using PLD.
- Repeat above experiments as needed.
- Prepare final report.