RX17-3

Laser Treatment of Semiconductor Precursors for Flexible Nanoelectronics

1. **Research Title:** Laser Treatment of Semiconductor Precursors for Flexible Nanoelectronics"
2. **Individual Sponsor:**

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3. **Academic Area/Field and Education Level:** Materials Engineering/Mechanical Engineering/Electrical Engineering (Master's or Ph.D. level)

4. **Objectives:**

The overall objectives for the proposed research are to further develop a commercially scalable techniques to produce flexible high quality semiconductors in a low temperature process suitable for state of the art flexible electronic devices.

5. **Description:** Growing high quality semiconducting materials on flexible substrates is difficult to impossible due to low temperatures and poor substrate-lattice matching. Recently, we developed a laser treatment technique that involves laser treating amorphous precursor materials and converting them to crystalline materials. The same technique is also of interest in dopant excitation in high quality semiconductors. This technique has proven to be quite viable on soft transparent materials, such as poly dimethyl-siloxane and other polymers. Amorphous pre-cursor films are magnetron sputtered at room temperature and subsequently treated with laser light to convert the amorphous materials to crystalline 2D materials. Effectively, the laser locally heats the amorphous film to crystallization temperature without heating flexible substrates to decomposition temperatures. The laser treatment is a kinetic heating process that requires precise control over the laser exposure. The work performed would involve studying the laser crystallization, the resulting materials, and reducing the process to practice.

6. **Research Classification/Restrictions:** Not classified. Not restricted

7. **Eligible Research Institutions:**

[X] **DAGSI** (Wright State University, AFIT, Ohio State University, University of Dayton, Miami University, Ohio University, University of Cincinnati)
PA Approval #