

DAGSI Research Topic Proposal

- 1. Research Title:** “Laser Treatment of 2D materials for Flexible Nanoelectronics”
- 2. Individual Sponsor:** List the AFRL research topic sponsor’s contact information

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 7/10/2015

Academic Area/Field and Education Level: Materials Engineering/ Mechanical Engineering/Electrical Engineering
 Master’s or Ph.D. level

- 3. Objectives:** Describe the overall objectives for the proposed research

The overall objectives for the proposed research are to further develop a commercially scalable technique to produce 2D materials in a low temperature process suitable for state of the art flexible electronic devices.

Description: 2D transition metal dichalcogenide (TMD) compounds (e.g., MoS₂, WS₂, MoSe₂, etc.) are molecularly thin materials that come with a variety of electronic properties. Their molecularly thin nature means that they can be stacked in a variety of ways to produce materials with nearly limitless possibilities of electrical properties. Low temperature, commercially scalable growth methods are vitally needed to enable state of the art flexible/wearable electronics based on 2D materials. Recently, we developed one of the only (if not the only) commercially scalable technique to grow these materials at low enough temperatures to coat flexible substrates such as rubbers and polymer substrates. 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. The work will involve studying this laser treatment process, the resulting materials, and reducing the process to practice.

Research Classification/Restrictions: Not classified. Not restricted

- 4. Eligible Research Institutions:** Indicate to what organizations this topic should be provided

DAGSI (Wright State University, AFIT, Ohio State University, University of Dayton, Miami University, Ohio University, University of Cincinnati)
 PA Approval # 88ABW-2015-3568

AFIT (only)

USAFA (only)
 If you are submitting a topic for the USAFA, indicate if you are also interested in sponsoring a USAF Cadet in summer 2015 (Average cost for USAF Cadet for 33 days is \$5000)

Yes No

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