NCD Semiconductor Materials, Processes, and Devices

Final CRADA Report

Nanoscience & Technology

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prepared by
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Participants: AKHAN Semiconductor, Inc.

09/04/14

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Non Proprietary Final CRADA Report

Date: 09/04/14

CRADA Number: C1300501

CRADA Title: NCD Semiconductor Materials, Processes, and Devices

CRADA Start/End Date: 07/02/13 to 08/10/14 This CRADA was terminated after the first year

Argonne Dollars: \$0

Participant Dollars: \$12,286.42

Argonne PI: Anirudha V. Sumant

Participant(s):

<u>AKHAN Semiconductor, Inc.</u>	<u>\$12,286.42</u>
Name	Participant Dollars

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Name	Participant Dollars

Complete Address

<u>N/A</u>	<u>\$</u>
Name	Participant Dollars

Complete Address

DOE Program Peter Lee
Manager:

Summary of Major Accomplishments:

Successfully integrated Argonne Low Temperature NCD deposition process (ANL-IN--09-070) with AKHAN n-type semiconductor process. Further, the combined process was successfully fabricated upon fused silica (glass) substrate whereby the demonstrated materials were substantially transparent, highly favorable to certain applications within the aerospace, telecom, and consumer electronics industries.

Summary of Technology Transfer Benefits to Industry:

The work performed under this CRADA enabled several benefits to industry, more specifically those pertaining to CMOS and semiconductor-on-glass power electronics systems. With respect to CMOS systems, the demonstrated materials under this CRADA allow for both 1) supporting existing silicon based electronics system through the incorporation of CMOS diamond semiconductor electronics thereby improving thermal and power handling capabilities, and 2) the further development of NCD based CMOS systems as a successor technology to the existing silicon CMOS platform whereby diamond based devices would have improved functionality in smaller device profiles, in addition to other gains in energy efficiency. With respect to semiconductor-on-glass power electronics systems, the demonstrated n-type NCD-on-glass materials may find benefit to the existing needs of aerospace, avionics, and telecom industry, whereby semiconductor on fused silica and sapphire substrates are necessary due to expected better radiation hardness of the materials as compared to silicon substrates. Further, the demonstration of n-type NCD-on-glass may be highly enabling to consumer electronics industry needs, where substantially transparent electronics systems are increasingly desirable.

Other Information/Results: (Papers, Inventions, Software, etc.)

US provisional patent application #61977151, "Transparent Electronic System & Method"

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