Applications of Nanodiamond films deposited by coaxial arc plasma deposition method

Zkria, Abdelrahman
Center for Japan Egypt Cooperation in Science and Technology, Kyushu University : Assistant Professor

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Keynote Speakers

Abdelrahman Zkria
Assistant Professor
Center for Japan-Egypt Cooperation in Science and Technology
Kyushu University, Japan
Email: abdelrahman@ejust.kyushu-u.ac.jp

Short Biography

Dr. Abdelrahman Zkria is an Appointed Assistant Professor at the Center for Japan-Egypt Cooperation in Science and Technology, Kyushu University. He received the B.Sc. degree in physics from Aswan University, Egypt, in 2006, the M.Sc. degree in nanophysics and solid-state physics from the Institute of Physics, University of Graz, Austria, and Aswan University, Egypt, in 2012. He obtained Ph.D. degree in Applied Physics from the Graduate School of Engineering Sciences (IGSES), Kyushu University, Japan, in 2017.
He worked as a JSPS Postdoctoral Fellow with the Department of Applied Sciences for Electronics and Materials, Kyushu University, from 2017 to 2019.
on the project titled in "Development of nanocarbon thin films for all-carbon photovoltaics". He joined the Department of Material Science and Engineering, North Carolina State University as a visiting scientist from Nov. 2018 to Mar.2019. Currently, he has been working as an Assistant Professor with Aswan University and the Center for Japan-Egypt Cooperation in Science and Technology (EJUST Center), Kyushu University. His responsibility in EJUST center is to promote the newly established project between IGSES, Kyushu University and Chemical and Petrochemical Engineering Department (CPE), EJUST, Egypt. His specific research interests are in the synthesis of nanomaterials, thin-film deposition, and diamond-related materials. He has more than 22 journal articles and has been an invited speaker and presenter on many national and international conferences.

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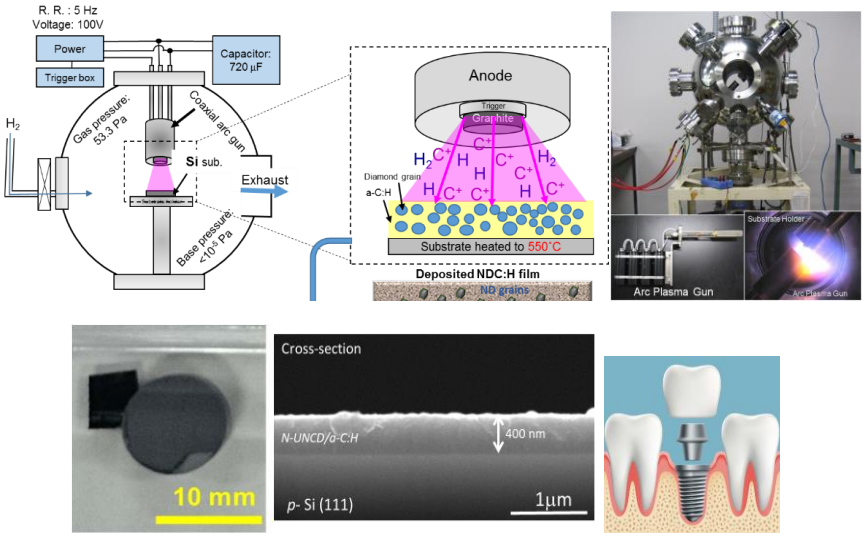
Abstract

Nanodiamond (ND) films have a superior properties which are strongly depends on their unique structure. The applications of ND films mechanically, biomedically, and electronically are attributable to their advantageous properties including conformal coating properties, high surface smoothness, unique optical and electrical properties originate from a large number of grain boundaries (GBs).
Nanodiamond films are mainly prepared by chemical vapor deposition (CVD). In CVD, the initial nucleation of diamond is required, specifically, a seeding procedure with diamond powders as a pretreatment of substrates prior to the film deposition, and high substrate temperature. On the other hand, we have successfully realized the growth of ND films by physical vapor deposition method, namely, coaxial arc plasma deposition (CAPD), without the pretreatment of substrates and at room temperature.
In our research group, we realized the growth of nanodiamond films by CAPD method. We demonstrated the n- and p-type ND semeiconductors by Nitrogen and Boron doping, respectively. The fabricated ND/Si heterojunction diodes exhibited a high rectifying action and photodetection properties. Additionally, ND films depsoited on Tungsten carbide (WC-Co) for Hard coating applications. Furthermore, ND films are grown on titanium and zirconia substartes for biomedical appliations, including implants and artificial joints.



Coaxial arc plasma deposition method, and Nanodiamond films deposited on different substrates for varrious applcations.