ЦЕНТЪР ЗА ОБУЧЕНИЕ – БАН

1000 София
ул. „Сердика“ № 4
http://edu.bas.bg

email: tdc-phd@cu.bas.bg
тел.: 02 987 31 67
02 979 52 60

Basic Information:
Course Title: OBTAINING OF NANO-SIZED FILMS AND STRUCTURES FOR APPLICATION IN NANO-ELECTRONICS, SPINTRONICS, OPTOELECTRONICS, SENSORS AND BIOPHYSICS.
Lecturer: Assoc. Prof., PhD Blagoy Spasov Blagoev
Phone: +359 885 238 494
Email: blago@issp.bas.bg
Total Teaching Hours: 20

Annotation (up to 150 words)

The course is suitable for young scientists, specialists, PhD students majoring in physics, chemistry and biology. The aim of the course is an introduction to the technology of obtaining nano-layers and nano-structures. Acquaintance with the basics of vacuum technology and thin film deposition. Mainly, magnetron sputtering and atomic layer deposition are considered. Acquaintance with the latest trends in the field of nanotechnology and their application in nano-electronics, spintronics, optoelectronics, sensors and biophysics.

.....
.....

Course content (brief description by topics or modules)
Topic / Module 1: History of nanotechnology.
Topic / Module 2: Infrastructure for the production of nanomaterials.
Topic / Module 3: Synthesis of nanomaterials and applications.

Teaching and assessment methods
Presentation (if more than 5 people) or individual discussions. The assessment will consist of writing an essay on one of the topics, followed by a discussion and review.

Competencies acquired as a result of training (3–5 points)
Basic knowledge of nanotechnology; vacuum, vacuum systems, cleanroom, deionized water production; methods for the synthesis of nanomaterials; applications of nanomaterials.

……

Literature:

[1] Parappurath N. Sudha, Kirubanandam Sangeetha, Kumar Vijayalakshmi, Ahmed Barhoum, Chapter 12 - Nanomaterials history, classification, unique properties, production and market, Emerging Applications of Nanoparticles and Architecture Nanostructures, Current Prospects and Future Trends Micro and Nano Technologies 2018, Pages 341-384

[2] Vacuum and Ultravacuum Physics and Technology, Igor Bello, CRC Press 2017/2018 by Taylor & Francis Group, eBook ISBN9781315155364. https://doi.org/10.1201/9781315155364

[3] Advances in Smart Coatings and Thin Films for Future Industrial and Biomedical Engineering Applications, Edited by A.S.H. Makhlouf and N.Y. Abu-Thabit 2020 Elsevier, ISBN: 978-0-12-849870-5. Chapters: 1, 13

[4] P.J. Kelly, R.D. Arnell, Magnetron sputtering: a review of recent developments and applications, Vacuum 56 (2000) 159}172.

[5] HANDBOOK OF CHEMICAL VAPOR DEPOSITION(CVD) Principles, Technology, and Applications, Second Edition, Hugh O. Pierson, NOYES PUBLICATIONS Park Ridge, New Jersey, U.S.A, 1999, ISBN: 0-8155-1432-8.

[6] Atomic Layer Deposition, Principles, Characteristics, and Nanotechnology Applications, Tommi Kääriäinen, David Cameron, Marja-Leena Kääriäinen, and Arthur Sherman, 2nd Edition, 2013 by Scrivener Publishing LLC, Co-published by John Wiley & Sons, ISBN 978-1-118-06277-7

[7] Synthesis and Applications of Electrospun Nanofibers, Ramazan Asmatulu, Waseem S. Khan, 2019 Elsevier, ISBN: 978-0-12-813914-1.

[8] Kashish Sharma, Dmitri Routkevitch, Natalia Varaksa, and Steven M. George, Spatial atomic layer deposition on flexible porous substrates: ZnO on anodic aluminum oxide films and Al2O3 on Li ion battery electrodes, Journal of Vacuum Science & Technology A: Vacuum, Surfaces, and Films 34, 01A146 (2016); doi: 10.1116/1.4937728.

[9] Adib Abou Chaaya, Mikhael Bechelany, Sebastien Balme and Philippe Miele, ZnO 1D nanostructures designed by combining atomic layer deposition and electrospinning for UV sensor applications, J. Mater. Chem. A, 2014, 2, 20650.

[10] Yuchan Zhang, Qilin Jiang, Mingquan Long, Ruozhong Han, Kaiqiang Cao, Shian Zhang, Donghai Feng, Tianqing Jia, Zhenrong Sun, Jianrong Qiu and Hongxing Xu, Femtosecond laser-induced periodic structures: mechanisms, techniques, and applications, Opto-Electron Sci 1, 220005 (2022).

[11] Imre Miklós Szilágyi and Dávidné Nagy, Review on one-dimensional nanostructures prepared by electrospinning and atomic layer deposition, Journal of Physics: Conference Series 559 (2014) 012010.

.....

Additional information (optional) (e.g., special requirements, laboratory equipment, prior knowledge)

.....

.....

.....

.....