Transilvania University of Brașov
INTERDISCIPLINARY DOCTORAL SCHOOL

ADMISSION TO DOCTORAL STUDIES Session September 2026

Field of doctoral studies: Materials engineering

Doctoral supervisor: Professor Daniel MUNTEANU

TOPICS FOR THE ADMISSION TO DOCTORAL STUDIES

TOPIC 1: Correlations regarding the effects of plasma activation of metallic surfaces (substrate), their wetting capacity and the adhesion of deposited hard coatings.
Contents / Main aspects to be considered: - Preparation of metallic substrates and their activation by plasma treatments, using different activation regimes. - Determination of the wetting capacity of surfaces by evaluating the contact angle. - Deposition of thin layers by the reactive sputtering process in magnetron regime. - Determination of the adhesion of thin layers, by different specific methods.
Recommended bibliography: 1. Alexandru Danchiv, Hidraulică aplicată; elemente de hidraulică generală și subterană. Editura Universității din București – 2000. 2. Donald M. Mattox, **Handbook of Physical Vapor Deposition (PVD) processing**, Second Edition 2010. 3. I. Iliuc, **Tribologia straturilor subtiri**, Ed. Academiei Romane, 1974. 4. D.S. Rickerby, A. Matthews, **Advanced Surface coatings – a Handbook of Surface Engineering**, Springer Science + Business Media New York, 1991.
Prerequisites / Remarks: *to be adapted/ completed/ deleted*
x Scientific Doctorate **☐ Professional Doctorate**
X without tuition fee (state budget funded) **☐ with tuition fee or with funding from other sources than the state budget**

TOPIC 2: Specially designed architectures of thin films; application in chemical sensing.
Contents / Main aspects to be considered: - Advanced materials for bio- and chemical sensing, based on nanostructured thin films. - The Physical Vapour Deposition (PVD) method; fundamentals. The Magnetron – sputtering deposition process. - Design, development, fabrication, and evaluation of different types of innovative sensors based on bi/tri-layered nanostructured thin films, produced by reactive magnetron sputtering.
Recommended bibliography: 1. Donald M. Mattox, **Handbook of Physical Vapor Deposition (PVD) processing**, Second Edition 2010.

2. D.S. Rickerby, A. Matthews, **Advanced Surface coatings – a Handbook of Surface Engineering**, Springer Science + Business Media New York, 1991.
3. "Chemical Sensors: A Global Market Report" by Global Industry Analysts, Inc, 2010.
4. G. Eranna, B.C. Joshi, D.P. Runthala and R.P. Gupta, "Oxide Materials for Development of Integrated Gas Sensors - A Comprehensive Review", Critical Reviews in Solid State and Materials Sciences, 29 (2004) 111.
5. A. Berna, "Metal Oxide Sensors for Electronic Noses and Their Application to Food Analysis", Sensors 10 (2010) 3882.
6. J. Homola, S.S. Yee and G. Gauglitz, "Surface plasmon resonance sensors: review", Sensors and Actuators B 54 (1999) 3.
7. C. Nylander, B. Liedberg and T Lind, "Gas detection by means of surface plasmon resonance", Sensors and Actuators 3 (1982) 79.
8. S.A. Maier, "Plasmonics: Fundamentals and Applications", Springer, New York, 2007.

Prerequisites / Remarks: *to be adapted/ completed/ deleted*

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Doctoral supervisor,

Prof. dr. eng. Daniel MUNTEANU

Signature

Coordinator of the field of doctoral studies,

Prof. dr. eng. Mircea Horia ȚIEREAN

Signature