Universitatea Transilvania din Brașov

Interdisciplinary Doctoral School

ADMISSION TO DOCTORAL STUDIES Session September 2023

Field of doctoral studies: Materials engineering
Doctoral supervisor: Prof. dr. eng. Mircea Horia Țierean

TOPICS FOR THE ADMISSION TO DOCTORAL STUDIES

TOPIC 1: *Research on the influence of substrate laser surface texturing on the quality of laser cladding*

Content / Main aspects to be considered

- State of art of laser cladding
- Obtaining of laser cladding on the laser surface textured substrate
- Characterisation of laser cladding samples (morphology, optical and SEM microscopy, hardness, roughness, wettability and tribological properties)

Recommended bibliography:

1. Mocanu, A.C. et al., Development of ceramic coatings on titanium alloy substrate by laser cladding with pre-placed natural derived-slurry: Influence of hydroxyapatite ratio and beam power, *Ceramics International*, Volume 49, Issue 7, 2023, 10445-10454, https://doi.org/10.1016/j.ceramint.2022.11.227.
2. Moldovan, E.R. et al., Morphological Analysis of Laser Surface Texturing Effect on AISI 430 Stainless Steel. *Materials* 2022, 15, 4580. DOI 10.3390/ma15134580.
3. Moldovan, E.R. et al., Wettability and Surface Roughness Analysis of Laser Surface Texturing of AISI 430 Stainless Steel. *Materials* 2022, 15, 2955. DOI:10.3390/ma15082955.
4. Yamaguchi, T. et al., Porosity reduction in WC-12Co laser cladding by aluminum addition, *Int J Refract Met Hard Mater*, Article vol. 110, 2023, Art no. 106020, doi: 10.1016/j.ijrmhm.2022.106020.
5. Yang, S., et al., Numerical Simulation and Multi-Objective Parameter Optimization of Inconel718 Coating Laser Cladding, *Coatings*, Article vol. 12, no. 5, 2022, Art no. 708, doi: 10.3390/coatings12050708.
6. Zuo-Jiang, S. et al., A thermal field FEM of titanium alloy coating on low-carbon steel by laser cladding with experimental validation, *Surface and Coatings Technology*, Article vol. 452, 2023, Art no. 129113, doi: 10.1016/j.surfcoat.2022.129113.

Prerequisites / Remarks: *studies in engineering, chemistry, physics*

TOPIC 2: *Researches on reducing the flammability of polymeric materials*

Content / Main aspects to be considered

- Polymers burning
- Flame retardation mechanisms – flame retardants for polymeric material
- Toxicity of smoke produced by burning polymers containing flame retardants

Recommended bibliography:

1. *Fire-Safe Polymers and Polymer Composites*, U.S. Department of Transportation, 2004, http://www.tc.faa.gov/its/worldpac/techrpt/ar04-11.pdf
2. *Development and Testing of Flame Retardant Additives and Polymers*, U.S. Department of Transportation, 2007, https://www.fire.tc.faa.gov/pdf/ar0725.pdf
3. Cubleșan V., *Propagarea arderii la materialele combustibile solide în interiorul incintelor*, Teză de doctorat UTCB, 2011, https://www.docdroid.net/q6ww/teza-doctorat-valentin-cublesan.pdf
4. Szolnoki B., *Development of novel flame-retarded epoxy resins and their composites*, PhD thesis, Budapest University of Technology and Economics, 2014,
5. Chen J., Gao X., Review on the Fundamentals of Polymer Combustion and Flammability Characteristics for Hybrid Propulsion, *Journal of Polymer and Biopolymer Physics Chemistry*, 2(4), 2014, http://pubs.sciepub.com/jpbpc/2/4/4/index.html
6. Van Wabeeke L., Flame retardant plastics: a general review, *International Polymer Science and Technology*, Vol. 29, No. 2, 2002, http://www.polymerjournals.com/pdfdownload/848369.pdf
7. Chivas C., Bertrand J.P., Malvaux C., Marlair G., Tack K., Smoke toxicity from combustion products based on polymers containing flame retardant additives, *The flame retardants Conference 2006*, Feb 2006, Londres, United Kingdom. pp.59-69. ffineris-00976169f, https://hal-ineris.archives-ouvertes.fr/ineris-00976169/document

Prerequisites / Remarks: *studies in engineering, chemistry, physics*

Doctoral supervisor,

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