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Supervisor's Report on Doctoral Thesis

Candidate: **Mgr. Alina Madalina Darabut**

Thesis Title: **Structural Characterization and Functional Properties of Epoxy/Graphite Composites for Fuel Cell Bipolar Plates**

I am pleased to submit this supervisor's report for the doctoral thesis of Mgr. Alina Madalina Darabut, who has conducted a research project focused on the development and detailed characterization of polymer composite materials for fuel cell bipolar plates. The topic is of high relevance and importance in the context of current global efforts toward decarbonization and sustainability, particularly in alignment with the European Green Deal's objectives to achieve climate neutrality by 2050.

The thesis reflects a comprehensive approach that integrates both theoretical and practical aspects of materials and surface science. The research focuses on synthesizing and characterizing epoxy/graphite composites tailored for proton exchange membrane fuel cells (PEMFCs) applications, with an emphasis on optimizing functional properties such as electrical conductivity, mechanical strength, and others. The work is divided into three parts, including the synthesis and characterization of thermally expanded graphite as a conductive filler, the investigation of interfacial interactions using functionalized graphene derivatives, and the fabrication and testing of composite materials in fuel cells.

During her doctoral studies, Mgr. Alina Madalina Darabut has demonstrated significant growth and scientific maturity. She has become fully independent in the preparation of samples and has gained valuable experience in a wide range of characterization techniques relevant not only to surface science but also to material science. Furthermore, she actively participated in international measurements, utilizing

advanced equipment such as synchrotron radiation photoelectron spectroscopy (SRPES), at Elettra in Trieste, Italy. She also completed a two-month research stay at the University of Rouen Normandie, in the Laboratory of Polymers, Biopolymers, and Surfaces, where she expanded her expertise in surface and materials characterization techniques. It is worth highlighting that she played an active role in all stages of the experimental work, including data acquisition, processing, and interpretation. Her work is consistently of high quality and reflects a systematic and well-structured research approach.

In addition to her experimental contributions, she has authored scientific publications and effectively communicated her results in a clear and professional manner, including the presentation of it on the international conferences. Her independence, strong work ethic, motivation, organizational abilities, and collaborative mindset have made her a valuable member of the research team.

The results presented in the first and third chapters of the thesis have been published in peer-reviewed journals and are also protected under a Utility Model. The results of the second chapter have been submitted as a manuscript, which has recently been accepted for publication following a successful peer-review process. The five percent similarity identified is attributed to self-plagiarism from the candidate's own published work and does not diminish the overall quality or originality of the thesis.

In conclusion, Alina Madalina Darabut has acquired and demonstrated all the competencies expected of a Ph.D. candidate, including independent experimental research, critical thinking, integration of scientific literature, data analysis, and academic communication.

I fully support the submission of her doctoral thesis and strongly recommend that Mgr. Alina Madalina Darabut be awarded the degree of Doctor of Philosophy.

Prague Mgr. Yevheniia Lobko, Ph.D.

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