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Habilitation thesis title: Valorization through Recycling of Solid Waste in the Context of the Circular Economy

Domain: ENVIRONMENTAL ENGINEERING

SUMMARY

The habilitation thesis "Valorization through recycling of solid waste in the context of the circular economy" is structured in three parts. The first part presents the scientific and professional achievements carried out after obtaining the title of Doctor in Materials Science and Engineering in 2011. In the second part, the evolution plan and the career development plan after the defence of the habilitation thesis are presented, and in the third part, the bibliographic references used in the first part of the thesis are presented.

Rapid population growth, intensive urbanization and increasing consumption of goods and packaging have generated a global explosion of waste, causing significant difficulties in its management. The lack of adequate infrastructure for proper collection, treatment and storage can lead to soil, air and water pollution, with negative consequences for biodiversity and the local economy. Solid waste recycling plays an important role in the circular economy, reducing the consumption of natural resources and greenhouse gas emissions, thus protecting the environment and stimulating innovation and economic growth by creating new business opportunities.

The first part of the thesis highlights the efficient use of polymeric solid waste (such as plastics, wood, rubber), photovoltaic module waste and construction and demolition waste to obtain composite materials with applications in external environments, without resorting to toxic additives. Composite materials based on sessiles have been tested and characterized both from a physico-chemical and mechanical point of view, highlighting the properties of control, resistance to traction, compression, impact. The influence of aging factors on the developed composite materials was analyzed, and the results were discussed and compared with those of the reference composites.

In the second part of the habilitation thesis, Plans for evolution and career development, the evolution of the university career is presented starting from obtaining the bachelor's degree in Physics and Chemistry at the Transilvania University of Braşov, obtaining the doctorate in Materials Science and Engineering at the University Transilvania from Braşov as well as the course followed until now, from a didactic and research point of view.

In terms of research activity, development plans include expanding the research field into new directions or sub-fields, collaborating with other research institutions or industries for collaborative projects, and obtaining funding for research projects. It is also important to maintain a balance between basic and applied research to contribute to scientific progress and practical problem solving.