

Materials Design and Systems Analysis

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Editors

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Preface

Materials, solids with a function, are basic modules of our living and work environment. There is a great worldwide demand for materials with improved or new functions, which allow for the development of innovative products and processes. In the last decade, material development was improved tremendously due to the introduction of test planning tools or simulation programs which increase the efficiency of the development phase itself. However, the main focus still lies on the technical aspect.

From the life cycle point of view, economic and ecological impacts of innovative materials often are identified after their development only, if at all.

In product design, on the other hand, the production costs at least will be considered in the design phase. Life Cycle Costing (LCC) and Life Cycle Assessment (LCA) still are not common, but gained a higher relevance in recent years.

The initial point of this workshop was the interdisciplinary research project: “Development of Geopolymers Supported by Systems Analysis”, which is funded by the Volkswagen Foundation.

The idea of this project is to achieve a new material (geopolymer) for selected applications, but with a more target-oriented development. To increase the efficiency of its development phase, less promising material combinations will be excluded progressively from further investigations. As ecological and economic aspects are considered, this kind of material development is brought closer to industrial application. Right from the beginning, LCA and LCC approaches are integrated in the development phase to identify the benefits and drawbacks of geopolymers developed in comparison to traditional materials.

Researchers and practitioners in fields of material development, product development, and systems analysis met at the workshop to share research ideas, present case studies as well as to discuss the challenges and obstacles in this relatively new field. The major problem identified was to bring both disciplines, materials science and systems analysis, together in daily R & D work. It was widely agreed on the fact, however, that the integration of systems analysis tools and life cycle thinking in the development phase minimizes innovation risks and allows for the development of more sustainable materials and products.

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Last but not least, I would like to express my deepest thanks to Prof. Richard Ernst from the ETH Zurich for his fiery opening lecture which inspired the whole workshop and the discussions.

Marcel Weil

For Anna und Lorena and a more sustainable future

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