

Wolfgang Peukert is organizing a workshop on graduate education in particle technology as part of a larger research program in particle design. He's asked IFPRI to support the workshop by encouraging members to attend and providing financial support for travel support to the academics (amount not determined, but probably on order of \$10,000). The workshop is described below:

International Workshop on

Exploring the future of teaching particle technology in a rapidly changing world

The prevailing paradigm of unit operations in particle science and technology has been gradually complemented and partly replaced by product-orientated approaches. The possibility to influence and optimize product properties at multiple length scales, ranging from the molecular structure, via nanoscopic or microscopic primary particles and their aggregates to the macroscopic distribution of these building blocks in 3D structures provides a wide parameter space to optimize the performance of man-made materials. True product design based on predictive models is thus expected to have a strong impact on assuring our industrial competitiveness, economic growth and better quality of life. Today, product properties are in the focus and the rigorous design of advanced particle-based products is a major challenge in the chemical, pharmaceutical, food and many other industries. Standard products or evolving products generated by 3D printing as well as advanced devices, for instance for energy conversion and storage, are all made from particulates or contain functional particles. Therefore, the key question is on the agenda: How can optimum particles be found for their later functional and structural applications and how can they be produced and processed? To reach this ambitious goal, a systematic and scientific approach is needed. The key to true product design is the understanding and rigorous optimization of property and process functions. Modern developments product design put the following challenges and opportunities on the agenda:

Widely expanding applications of particulate products, e.g.

- Additive manufacturing and 3D printing
- Energy conversion and storage (batteries, fuel cells, solar cells...)
- Life science technologies (food, biotechnology, tissue engineering by cell printing ...)
- Nanotechnology: transfer from lab to application

New classes of products require

- New value chains and process chains
- Innovative methods of product design and process integration
- Interdisciplinary exchange across many disciplines
- Hierarchical structure formation
- Interface engineering for nanoparticle integration into functional devices
- Multiscale modelling and simulation
- Advanced optimization and quality control for knowledge-based structure-property-process design

What are the consequences and key questions in a rapidly changing world:

- Which fundamentals should be included in the curriculum as basis for the next generation particle engineers?

- How to expand this basis towards product design and formulation technologies?
- How to transfer this know-how to practicing engineers in industry?

We plan to provide an interdisciplinary forum and exchange platform for experts from industry and academia around the world (Asia-Pacific, Europe and USA).

Mission of the workshop

Exploring state-of-the-art concepts in teaching particle technology and product design in a rapidly changing world

The industrial view:

- Industrial needs in key areas such as chemical industry, food, pharma and life science industries, consumer goods
- Experiences with product design of nanoparticles, organic crystalline and amorphous particles, particles for energy conversion and storage and other selected applications.
- Which fundamentals are required or missing?

Academic view and experiences:

- Best practice examples to teach particle technology and product design?
- How to tackle the increasing complexity and product diversification?
- Collaborations and exchange of teaching formats
- Online courses and resources for particle technology learning
- Modern particle technology practical lab

When: Fall 2020

Where: University Erlangen-Nuremberg, Germany

Who: Experts from both industry and academia

How long: 2-3 days

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