SFB 920

Multifunktionale Filter für die Metallschmelzefiltration – ein Beitrag zu Zero Defect Materials

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DEAR READERS,

Developing novel materials requires the collaboration between scientists from different academic disciplines, which enables the integration of knowledge from several scientific fields. Holding a “Workshop on the mechanical modeling of random open cell foams,“ the CRC 920 offered a unique opportunity for intensive dialogue between experts on structural mechanics and stochastic geometry that gave fresh impetus to the development of innovative filter materials and filter systems based on foam structures.

This workshop as well as other activities of the Integrated Graduate Program aimed at supporting young scientists in materials science and engineering with regard to contents and methods and to empower them to participate in interdisciplinary dialogue. Details on these and other activities, results and next steps are available in our latest issue of this newsletter. Further information is provided at http://sfb920.tu-freiberg.de. We hope you‘ll enjoy the newsletter.

Yours sincerely,

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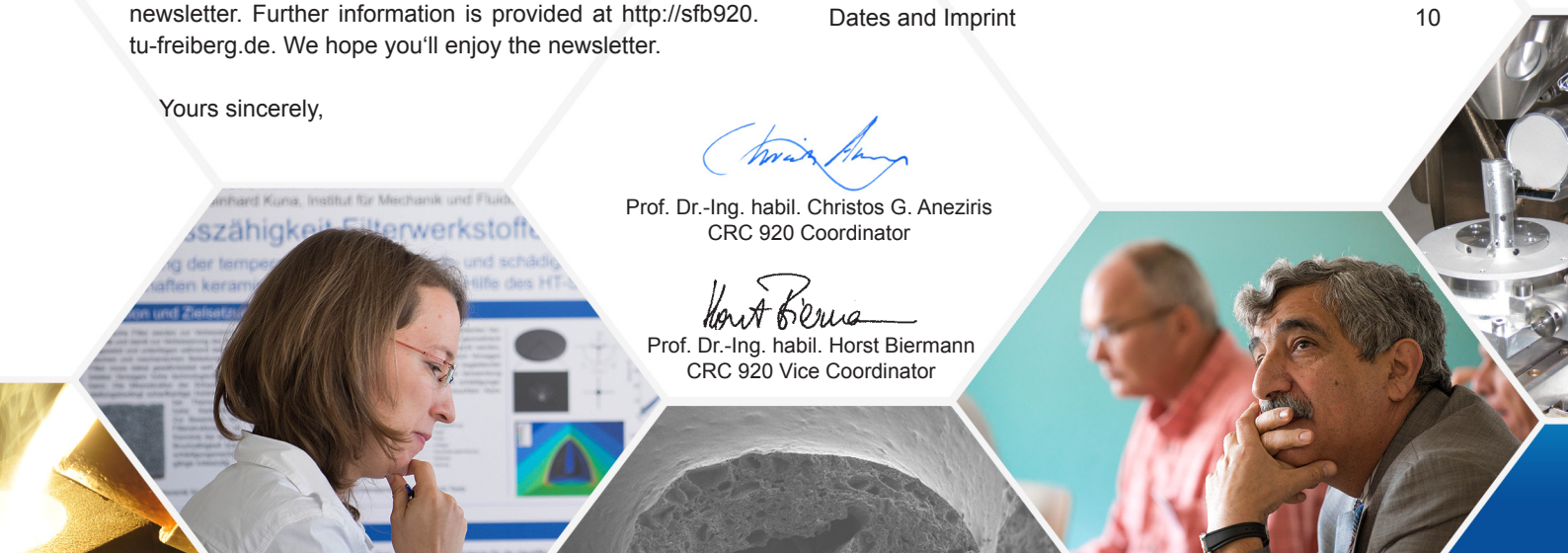

RICH OPPORTUNITIES FOR TRAINING AND QUALIFICATION

The Integrated Graduate Program embedded in the CRC 920 puts strong efforts on a comprehensive training and qualification of its doctoral students. The ultimate goal is to ensure an excellent education and an accelerated graduation of young researchers. To this end, various lectures and workshops with guest from academia and industry were offered that addressed both professional knowledge as well as individual capabilities with great importance for a successful graduation.

On the occasion of the 7th Doctoral Meeting in June 2013 the CRC 920 welcomed **Prof. Charles E. Semler**, Fellow and former Vice President and Chairman of the Refractories Division of the American Ceramic Society. He gave a talk on basic facts and advances in steelmaking refractories.

Photo (from left to right): Prof. Charles E. Semler, Prof. Christos G. Aneziris, Prof. Subhashis Ray, Eric Werzner

Moreover, doctoral students were invited to join two guest lectures organized by the CRC 799 "TRIP-Matrix-Composite." Prof. Masao Sakane from Ritsumeikan University Kyoto, presented research results on the fatigue behavior of metallic materials.

Dr. Peter Nold from Maschinenfabrik Gustav Eirich GmbH & Co. KG in Hardheim provided a workshop on fundamentals of ceramic materials preparation, entitled "Mixing, granulating, coating, plasticizing and slurrying in the ceramic industry." Referring on technological and economic requirements of preparation processes, he demonstrated the impact of mixing tools, power and speed on the mixed product and, hence, on relevant properties of a material.

Photo: Dr. Peter Nold (middle) with Dominik Krewerth (left) and Christiane Biermann (right)

Also, a workshop on „Rules of good scientific practice" was offered to the CRC doctoral students. **Prof. Broder Merkel**, Liaison Officer of the German Research Foundation DFG at TU Bergakademie Freiberg, discussed guidelines on safeguarding good scientific practice, which are intended to prevent scientific misconduct. ■

SCHOLARS VISITING THE CRC 920

Photo: CRC research assistant Steffen Dudczig (middle) with PhD scholars Ashish Pokhrel (left) and Enrico Storti (right)

Holding scholarships from the CRC 920 and the German Academic Exchange Service DAAD, doctoral and master students from four countries are joining CRC research teams. During a 12-month visit, until spring 2014, **Enrico Storti from Italy** and **Ashish Pokhrel from Nepal** are being involved in the subprojects A01 and A02. Recently, Dig Vijay (India) and Jorge René Gavidia Alas (Canada), who participated in subproject B03, have successfully finished their visit in Freiberg.

Funded by the ERASMUS program "Lifelong Learning Programme: Erasmus Student Mobility for Placements 2012/2013," the master student **Francesco Sponza from the Università di Padova (Italy)** is visiting the CRC. Until the end of November, he will be conducting field studies which are an integral part of his master thesis.

Scholarships for students and doctoral students are of great importance to the CRC 920 because they support the integration of young scientists from abroad into local research activities. Moreover, these scholarships enable CRC doctoral students to establish and extend their working relationships with colleagues and experts around the world. ■

ENHANCING INTERDISCIPLINARY RESEARCH

Developing novel materials requires the collaboration of scientists across scientific disciplines. For the first time, a CRC 920 workshop brought together experts in the fields of structural mechanics and stochastic geometry. Discussions centered on new ways for analyzing and modeling foam structures.

Their paths do not often cross: experts in the fields of structural mechanics, who focus on modeling structures under mechanical load, and experts who study random spatial patterns based on mathematical approaches. Yet, the development of new materials may greatly benefit from the combination of knowledge gained in both fields.

Against this background, the CRC 920 and the Institute of Mechanics and Fluid Dynamics at the TU Bergakademie Freiberg initiated an international "Workshop on the mechanical modeling of random open cell foams." Following an invitation to Freiberg, five internationally leading experts took part in this workshop: **Prof. Martin Ostoja-Starzewski** (University of Illinois/USA), **Prof. Andrew Kraynik** (currently COFUND Senior Research Fellow at Durham University/UK), **Prof. Stelios Kyriakides** (University of Texas at Austin/USA), **Prof. Claudia Redenbach** (TU Kaiserslautern, Germany) as well as **Prof. Dietrich Stoyan** (TU Bergakademie Freiberg).

The presentations focused on approaches for modeling open-cell foam structures as well as ways to describe geometric properties of such structures. Investigations of foam structures play a crucial role for the CRC: The CRC researchers aim at developing smart ceramic foam macro structures which improve the purity of metal melts by efficiently reducing non-metallic inclusions. To accomplish this goal, researchers seek to better understand the relations between geometric properties and the behavior of ceramic foam structures under thermal or mechanical load. In order to develop a proper design modeling and, hence, predicting effects of structures on relevant properties is an important issue for the development of the new filter materials and systems.

The workshop and also the panel discussion, which took place after the presentations, are first steps towards the integration of research results from different academic disciplines that may provide fresh impetus to research activities of the CRC. Consequently, this interdisciplinary dialogue will be continued in the future. ■

Photo: Speakers and participants of the CRC workshop (from left to right): Torsten Sieber, Prof. Kraynik, Prof. Redenbach, Dr. Abendroth, Prof. Ostoja-Starzewski, Prof. Kyriakides, Johannes Storm

Photo: Prof. Dietrich Stoyan, discussion with presenters

Photo: Speakers and participants of the CRC workshop, joining the panel discussion

What was your motivation to attend this workshop?

Prof. Kraynik: We all came with expertise and some aspects on modeling mechanical properties in foam structures, to exchange what we know with the group here.

Which challenges do you see pertaining to the development of novel filter materials?

Prof. Kyriakides: The development of ceramic filters is an extremely interdisciplinary issue which involves many aspects of engineering and science. I think we touched several aspects of that issue during the meeting here. We have also seen the importance of an effective communication within multi-disciplinary teams.

Prof. Ostoja-Starzewski: Additionally, tremendous developments in computer technology will play an increasing role in understanding relationships between foam structures and properties.

Which impressions did you receive from the CRC 920?

Prof. Kraynik: The aim the CRC is pursuing is ambitious. I would like to encourage the people in this group, although the problem they tackle is very hard. It is really refreshing to see how people are trying to do something together.

Prof. Kyriakides: I think this is a nice group and I like the way how the group handles its research tasks.

Prof. Ostoja-Starzewski: My experience here is quite unique. Discussing research problems with the entire group was very interesting.