Stellenausschreibung
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FRIEDRICH-SCHILLER-
UNIVERSITÄT
JENA

Doctoral Researcher Position at the Institute of Earth Sciences, Faculty of Chemistry and Geosciences, within the DFG Priority Programme SPP 2005 "Opus Fluidum Futurum - Rheology of reactive, multiscale, multiphase construction materials"

The main focus of the program is to:

- Investigation and analysis of the interaction of reactive (hydrating) particles on the nano- to microscale including the quantification of influences (morphology, chemistry, temperature, time, etc.) on and modeling particle interaction;
- Development of strategies and concepts for the description of deformation and flow processes of fresh concrete based on microscale processes and taking into account mesoscopic processes (demixing, deaeration, fiber distribution, etc.);
- Analysis and penetration of the relevant processing operations of fresh concrete (conveying, installation, compacting, smoothing, etc.) using scientific tools and methods of rheology;
- Elaboration of the measurement methods for the detection of the fresh concrete behavior at different viewing levels and for different stress scenarios;
- Development of constitutive fabric laws for fresh concrete to simulate the phases and processes of the processing.

The collaborative project *"Component additive approach to predict cement paste rheology considering mineral and particle heterogeneity on different scales; CONCERT"* within the SPP 2005 is a joint venture between the Bauhaus University Weimar (Prof. Professor Dr.-Ing. Horst-Michael Ludwig), the Karlsruhe Institute of Technology (KIT; Dr.-Ing. Michael Haist) and the Friedrich Schiller University Jena (Prof. Dr. habil. Thorsten Schäfer). Close cooperation within CONCERT and the multi- and interdisciplinary SPP 2005 consortium with researchers from Physics, Chemistry, Materials Science, Civil Engineering and Mineralogy offers unique prerequisites for transferring the findings from basic research into applications.

We invite applications for a **Doctoral Researcher Position (m/f; Ref.-No. 366/2017)** at the Institute for Geosciences, Applied Geology of the Friedrich Schiller University Jena for Investigations on cement component and hydration product surface models for predicting particle interactions

Surface complexation models (SCoMs) for the different mineral phases in cementitious systems and combination thereof will be established based on adsorption studies (including superplasticizers; SPs), zeta potential and AFM force-distance measurements. The rheological behavior of corresponding colloidal suspensions will be studied and serve to calibrate the link between SCoMs / DLVO theory and rheological modelling. Stability of organo-mineral phases subject to shear will be investigated using radiotracer labelling of SPs as well as sulfate carriers. Model description will include a component additive model, allowing to quantify the mechanical interaction behaviour as a function of particle composition, granulometry, composition of carrier liquid, temperature and progress of hydration (surface roughness). Within the CONCERT consortium it is planned to use this model as a basis for the probabilistic formulation of the Eigenstress-state to be used in a homogenized rheology model setup that describes the sum of all particle interactions.

Requirements:

- A Master's degree (or equivalent) in physics, chemistry, mineralogy or surface and interface science or a related discipline (M.Sc. or equivalent degree has to be earned before December 2017)
- Knowledge to perform sorption studies, handle microscopy techniques (AFM) and their application in surface science
- Excellent technical skills and in the operation of complex instruments and their adaptation to measurement requirements
- Programming mathematics and/or physics skills to develop a DLVO/charge regulation based particle interaction model are highly recommended
- Basic skills in organic synthesis and experience working in a controlled area with radioactive material are an advantage
- Enthusiasm to play an active role in the interdisciplinary research team of CONCERT
- Highly motivated and creative personalities
- Excellent written and oral communications skills in English

We offer:

- A half position with a gross-salary according to TV-L (initially for 3 years with an elongation option)
- Opportunity for research on an innovative and worldwide unique research platform
- A communicative atmosphere within a scientific network providing top-level research facilities and training program, including participation in international and national conferences, summer schools and Workshops
- The place of work are the cities of Jena and Karlsruhe, Germany, both young and lively university town with dynamic business activities, successful scientific centers of innovation, and a vibrant cultural scene.

Severely disabled applicants with equal qualification and aptitude are given preferential consideration.

Applications should be written in English. The application deadline is January 31, 2018. Intended starting date is March 2018.

Applications are submitted exclusively via e-mail to: regina.piechnick@uni-jena.de

Selected applicants will be invited to a recruitment meeting. For more information on the position, feel free to contact Prof. Dr. Thorsten Schäfer (thorsten.schaefer@uni-jena.de).