**PhD-position on High Performance Reactive Transport Modelling in Cementitious Materials**

**3 years, starting October 2015**

The Institute for Nuclear Waste Management and Reactor Safety (IEK-6) of Forschungszentrum Jülich, Germany (Research Centre Jülich) performs cutting-edge research in the fields of nuclear waste management and safety. In this respect, the development and application of complex simulation tools and experimental methods play a crucial role. The Jülich Supercomputing Centre (JSC) of Forschungszentrum Jülich operates one of the most powerful High Performance Computing (HPC) infrastructures in Europe, enabling scientists and engineers to solve highly complex problems by numerical simulations. Amphos 21 Consulting S.L. is a world leading scientific consulting company located in Barcelona, Spain. For further information visit our websites [http://www.fz-juelich.de/iek/iek-6/DE/home/\_node.html](http://www.fz-juelich.de/iek/iek-6/DE/home/_node.html%20) and [www.amphos21.com](file:///C%3A%5CUsers%5Cg.deissmann%5CDocuments%5CProjects%5CCEBAMA%5Cwww.amphos21.com).

IEK-6 and Amphos 21 are offering a shared PhD position in the field of high performance reactive transport modelling in cementitious materials. As part of the European Project Cebama (Cement-based materials, properties, evolution, and barrier functions, visit <http://www.cebama.eu/>), within the Horizon 2020 Framework Programme, the PhD candidate will interact with top level scientists in the fields of computational modelling, reactive solute transport, cement chemistry, concrete technology, and nuclear waste management.

The candidate shall have the flexibility to spend part of the time at IEK-6 (Germany) and part of the time at Amphos 21 (Spain). In addition, the candidate shall participate in the Annual Meetings of the Cebama project, where the most recent results of the research will be presented.

***Working topic:***

The research topic is related to High Performance Reactive Transport Modelling of chemically-driven degradation of cementitious systems and the coupling to the physical properties of the concrete barriers. The focus is on the impact of chemical reactions expected to occur under nuclear waste repository conditions on the flow and transport properties of the cement matrix, and also on the mechanical behaviour. Cement barriers will be used in nuclear waste repositories with different purposes, although the main goals are typically to use them as a hydraulic barrier and to retard the migration of radionuclides in the event of failure of the waste containments (due to the low permeability and diffusivity of cementitious materials and to their good sorption properties). Reactive transport models of the leaching of calcium and other degradation processes as well as of radionuclide migration will be applied at different scales, ranging from the pore-scale to the macroscopic scale. To this end, the High-Performance Computing infrastructure provided by JSC will be used.

***Qualifications:***

* M.Sc. (or equivalent degree) in civil, chemical, geological engineering, material’s science, applied mathematics, physics, computer science or related natural science.
* Good communication skills and good command of English and preferably also of German.
* Ability to write scientific papers for publication in scientific journals.
* Good computing and software development skills (programming in Java, C++), and good knowledge in computational mathematics in porous media.

***Salary:***

Payment of the PhD fellow will be based on salary grade 13/2 Collective Agreement for the Civil Service (TVöD). Equal opportunities are a cornerstone of the staff policy of Forschungszentrum Jülich. Therefore applications from women and disabled persons are welcome. Duration of contract: 36 months.

***Locations:***

Forschungszentrum Jülich represents a vibrant international and interdisciplinary work environment, located on an attractive research campus, ideally situated between the cities of Cologne, Düsseldorf, and Aachen.

Amphos 21 a scientific consulting company with a multidisciplinary and multicultural staff in the fields of chemistry, hydrogeology, engineering and computing sciences. It is located in the city centre of Barcelona, Spain.

***Contact Information:***

For further information, please contact Dr. Guido Deissmann (e-mail: g.deissmann@fz-juelich.de) or Dr. Andrés Idiart ([andres.idiart@amphos21.com](file:///C%3A%5CUsers%5Cg.deissmann%5CDocuments%5CProjects%5CCEBAMA%5Candres.idiart%40amphos21.com)).

Interested candidates should send their application, preferably via e-mail, to:

Dr. Guido Deissmann (e-mail: g.deissmann@fz-juelich.de), and/or to

Dr. Andrés Idiart (e-mail: andres.idiart@amphos21.com)