

## **Job Posting - PhD position**

Marie Curie Initial Training Network "SHeMat" (FP7-PEOPLE-ITN-2011-290308) for **Self-Healing materials**: from Concepts to Market.

**Recruiting organisation:** Plant Biomechanics Group, Botanic Garden, Faculty of Biology, University of Freiburg, Germany

**PhD-project title:** »*Self-repair mechanisms in plants growing under extreme ecological conditions as concept generators for self-repairing technical structures*«

**Starting date:** 1st January 2013

In 2007 the University of Freiburg became one of nine top universities in Germany to be honoured in the Excellence Initiative. Since 2002 the University of Freiburg is founder member of the »Competence Network Biomimetics«, an interdisciplinary working network, whose members are engaged in the systematic transfer of problem solutions of nature into technical applications (biomimetics).

In the Plant Biomechanics Group situated at the University of Freiburg and member of the »Competence Network Biomimetics« the main focus of the research and development activities is the quantitative analysis of the relationship of form, structure and function in plants and plant organs, and the transfer of principles into innovative bio-inspired technical products. The scientists of the group cover with their competences the whole value chain from basic biological research to the development of biomimetic products on a lab-bench scale.

Plants have increasingly developed the ability to seal and heal wounds during the evolutionary process over the last 3.8 billion years. Based on self-sealing processes found in vines the principles we successfully transferred into the development of a biomimetic patent-registered self-repairing PU-foam coating for the membranes of pneumatic systems. Quantitative analyses of self-healing mechanisms in latex containing plants were prerequisites for the development of rubber based elastomeric materials that are able to repair themselves or reduce respectively to stop propagation of occurring micro-cracks.

In this PhD project promising model plants from different systematic groups will be screened and selected for self-repair mechanisms. Since a high evolutionary pressure on the development of self-healing abilities can be assumed, independent evolution of self-healing including different mechanisms and structures in different plant groups and species can be expected. Plants growing under extreme ecological conditions as e.g. in arid or other habitats with high drought stress or in highly UV exposed environments have an especially high selective pressure on the development of very effective and fast self-repair mechanisms. Quantitative structural and functional analyses of the self-healing processes in selected model plants will help to specify novel mechanisms of self-repair. These studies are a prerequisite for a successful transfer into innovative biomimetic self-repairing materials that will also function under harsh environmental conditions. Collaboration with the University of Bristol and with Fraunhofer UMSICHT (Oberhausen) is intended.

Applicants must meet the eligibility requirements and hold a master's degree in biology. Key competences for understanding the structure-function-relationships in plants are quantitative analyses based on morphological-anatomical and biomechanical experiments. Knowledge and experience in histo-chemical procedures, LM-, TEM- & SEM-methods as well as multi-scale mechanical testing, a good knowledge about plant diversity, and experience in the field of self-healing materials will be greatly appreciated.

Furthermore applicants should:

- Be fluent in English
- Provide outstanding marks and benefits (preferably under the best 10 % of the graduation year)
- Be experienced and interested in interdisciplinary research
- Send a motivation letter (describing how the project and the ITN will benefit from their work and scientific background - 400 words max.)
- Be flexibility to move around within the project duration
- Name at least two persons that might be contacted concerning references

The PhD project lasts for 3 years.

Applicants should send a cover letter, a CV and a motivation letter to:

Dr. Olga Speck

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**Application: as soon as possible**