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Research Success Stories



June 2014

Back to an old passion to start a new venture

MERESPO is an experimental research program that pioneers the development of intelligent polymers whose macroscopic properties change in response to external mechanical forces in a pre-programmed and useful manner.

After serving for about ten years as a professor in the USA, Prof. Christoph Weder returned to Switzerland in 2009. He now leads the Adolphe Merkle Institute at the University of Fribourg, where he established a research group that focuses on the development of functional polymeric (nano)materials.



Prof. Christoph Weder
 Director of Adolphe Merkle Institute
 University of Fribourg

An old passion

Back in 2002, Prof. Weder's group was among the first to exploit mechanical transduction processes - the conversion of mechanical into chemical events - to create fluorescent polymers which change their emission color when exposed to mechanical stress. The general idea to utilize

mechanically induced chemical reactions to trigger pre-programmed events in polymers has attracted widespread interest from researchers around the globe, and "my colleagues took research in this domain in completely new directions" said Prof. Weder.

A new venture

This, in turn, inspired him to renew his own programs in the field. "The ERC Advanced Grant has been a wonderful opportunity to re-launch my activities in this domain after returning to Europe" he said. The ERC grant has allowed Prof. Weder to launch a high-risk / high-reward venture on the design of new polymers with unusual and previously unavailable functionalities, such as mechanically induced generation of light, mechanically controlled cell growth, auto-lubricating behavior, and the ability to release small

"My research is motivated by the goal to develop novel materials that display unusual properties and are useful."

molecules such as drugs, fragrances and antiseptics.

ABOUT THE PROJECT

"Intelligent" polymers which change their properties "on command", that is upon exposure to a pre-defined stimulus in a highly selective and reversible manner, are of considerable academic interest and potentially useful for countless technologically relevant applications.

Many examples of chemically, thermally, electrically, optically, or electrically responsive materials are known, but only few polymers have been studied, which respond in a useful and predictable manner to the exposure of mechanical stress. With MERESPO, Prof. Christoph Weder explores the possibility to a new family of bio-inspired, mechanically responsive polymers in which mechanical stress provides the activation energy to trigger specific pre-programmed chemical reactions. These reactions, in turn, are used to bestow polymers with unusual and previously unavailable functionalities.

Starting a National Center of competence

An important feature of the ERC Advanced Grant is that it allows one to appoint a handful of researchers over a period of five years, which permits a significant and sustained program that would otherwise be very difficult to fund. Contrary to the public opinion about European grants, the administrative tasks are actually quite simple. First results from the program have already inspired several new collaborations and some of the break-through findings spurred the work of one module of the new Swiss National Center of Competence in Research Bio-Inspired Materials.

FACTS AND FIGURES

Project Name:	MERESPO Mechanically Responsive Polymers
Research Area:	Synthetic chemistry and materials
Coordinator:	Prof. Christoph Weder
Organization:	University of Fribourg (Adolphe Merkle Institute)
Start Date - End Date:	2012/05/01 - 2017/04/30
Duration:	60 months
Project Cost:	3 million Euro
Project Funding:	2 million Euro
Contract Type:	ERC Advanced Grant
FP7 Reference Number:	291490

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