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Fraunhofer IWS scientists are now able to offer n-conductive polymers as processable paste

The Fraunhofer IWS has made another important step forward with respect to the research on n-conductive polymers for printed electronics. The Dresden scientists succeeded in modifying an n-conductive polymer, already synthesized in 2015, in such a way that it can now be processed as a paste and be printed in a three-dimensional manner.

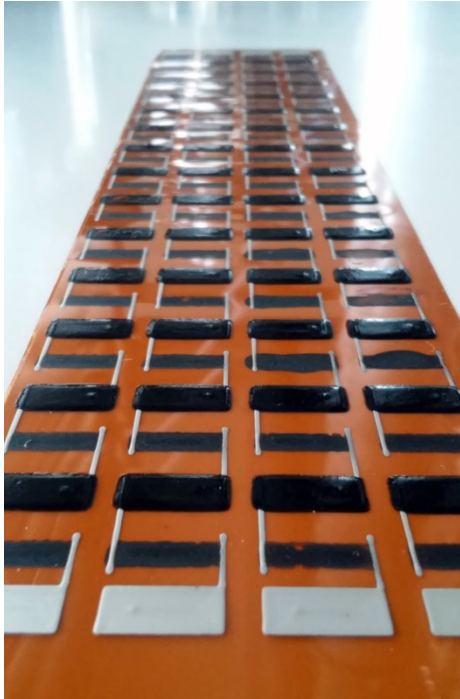
At first sight, for many people conductive polymers are paradox, in particular, when we think of those plastics we are surrounded by in everyday life. Nevertheless conductive polymers are already used in many technical applications, e.g. batteries, LCD screens, transistors and solar cells. Actually it has already been known in the eighties that the electrical conductivity of polymers may reach that of metals. In 2000, the Nobel Prize for Chemistry was awarded exactly for this discovery.

The main difference between polymers and metals is the fact that in the case of metal, electrons are responsible for the electrical conduction process. However, in commercially available polymers (e.g. PEDOT: PSS) charge carriers with positive elementary charge are responsible for electrical conductivity (p-conductivity).

The design of completely electronic components requires p-conductive as well as n-conductive material. N-conductive polymers are often the famous bottleneck in many technical applications. Often they show poor electrical conductivity and structural integrity. Both properties strongly suffer from degradation due to environmental influences. In 2015, however, the IWS group "Printing" successfully synthesized an n-type polymer with an enhanced conductivity of one order of magnitude (compared to the values in literature of other n-conductive polymers, http://www.iws.fraunhofer.de/en/pressandmedia/press_releases/2015/press_release_2015-19.html).

Nevertheless, applications of n-conductive polymers had to face further challenges. Similar to its p-type archetype PEDOT, the IWS-developed polymer was also almost insoluble in all known solutions. This challenge has been mastered now! For the very first time a thermoelectric generator (a device which is able to generate electrical power) has been designed and tested. The Dresden scientists are going to present their results at the "14th European Conference on Thermoelectrics" in Lisbon.

Material development, system design and manufacturing technologies of thermoelectric generators will be important topics of the workshop "Energy Harvesting Systems – FlexTEG", taking place at the Fraunhofer IWS Dresden on September 26 – 27, 2016. Please find further information at: <http://www.iws.fraunhofer.de/flexteg>.



Printed TEG (thermoelectric generator) made of p- and n-conductive polymer and silver contact
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