

'There's a hole in my bucket ...'

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Cracks, splits and holes are by definition one of the biggest problems in sealing technology. A new addition has recently been made to the thermoplastic elastomer family: Swellable variants of these plastics react to leaking water and thus stop the leaks.

Everyone is familiar with thermoplastic elastomers (TPE) used in toothbrushes, cellphone keypads or screwdrivers. They benefit ordinary users, giving the hand a pleasantly soft and secure grip. They also benefit manufacturers, who can melt down the rubbery plastics and process them in the same way as the thermoplastics polyethylene, polypropylene and polystyrene. The TPE material can also be injection-molded, extruded or calandered (rolled into sheets and films) in large quantities at correspondingly low costs. It can even be welded, which is particularly desirable when using it in the building industry.

Image: Holger Wack inspects samples of his new plastics in dry and swollen condition.

Researchers from the Fraunhofer Institute for Environmental, Safety and Energy Technology UMSICHT have succeeded in extending this family of materials by adding a further component: polyacrylate which is known for its excellent absorptive properties. The resulting thermoplastic-elastomer composites are registered as Q-TE-C®. They swell up to several times their dry volume when in contact with water. But what is even more important: they can be processed like TPE. “We have moved into new territory,” Holger Wack firmly believes after extensive research in patent publications. “That encouraged us to apply for a patent on the basic formulation just under a year ago.”

The deputy head of the special materials department already has a laundry list of potential applications, mostly dealing with the broad topic of sealing technology. These plastics could reveal their talents whenever it is important to prevent water or aqueous solutions from leaking out or penetrating into adjacent spaces. Wack explains a self-sealing pond liner as an illustration of how they work. “It consists of a layer of the new material with normal waterproof sheeting on both sides. If water seeps out through a tiny hole, the Q-TE-C® layer swells up and seals the damaged spot.” In pipe connections, another significant factor comes into play: The damp material is now locked between solid parts, which restricts its volume expansion. The sealant increases the pressure on the solid parts and thus mends the leak.

The various types of plastic require different specific properties depending on their application. The researchers are therefore currently elaborating methods for demonstrating that a particular material is suitable for the sealing task it is designed to do. Details of this and other aspects will be shown in Hall B2 at IFAT, the leading international trade fair for waste disposal and the environment, held in Munich, Germany

from April 25 to 29.

Source: Fraunhofer-Gesellschaft

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