

Press Release



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Covestro AG
Communications
51365 Leverkusen

Contact
Petra Schäfer
Telephone
+49 214 6009 6332
Email
petra.schaefer
@covestro.com

Elastic textile fibers made from carbon dioxide

Dress with CO₂

- **Covestro and RWTH Aachen University develop industrial process**
- **Reduction in use of crude oil and contribution to the circular economy**
- **Further milestone in the use of CO₂ as an alternative raw material**

Dress with CO₂: Two research projects have succeeded in making elastic textile fibers based on CO₂ and so partly replacing crude oil as a raw material. Covestro and its partners, foremost the Institute of Textile Technology at RWTH Aachen University and various textile manufacturers, are developing the production process on an industrial scale and aim to make the innovative fibers ready for the market. They can be used for stockings and medical textiles, for example, and might replace conventional elastic fibers based on crude oil.

The elastic fibers are made with a chemical component that consists in part of CO₂ instead of oil. This precursor called cardyon[®] is already used for foam in mattresses and sports floorings. And now it is being applied to the textile industry.

“That’s a further, highly promising approach to enable ever broader use of carbon dioxide as an alternative raw material in the chemical industry and expand the raw materials base,” says Dr. Markus Steilemann, CEO of Covestro. “Our goal is to use CO₂ in more and more applications in a circular economy process and save crude oil.”

Sustainable production process

The fibers are made from CO₂-based thermoplastic polyurethane (TPU) using a technique called melt spinning, in which the TPU is melted, pressed into very fine threads and finally processed into a yarn of endless fibers. Unlike dry spinning, which is used to produce conventional elastic synthetic fibers such as



Elastane or Spandex, melt spinning eliminates the need for environmentally harmful solvents. A new chemical method enables carbon dioxide to be incorporated in the base material, which also has a better CO₂ footprint than traditional elastic fibers.

“The CO₂-based material could be a sustainable alternative to conventional elastic fibers in the near future,” states Professor Thomas Gries, Director of the Institute of Textile Technology at RWTH Aachen University. “Thanks to our expertise in industrial development and processing, we can jointly drive establishment of a new raw materials base for the textile industry.”

Development of the method of producing fibers from CO₂-based thermoplastic polyurethane has been funded by the European Institute of Innovation and Technology (EIT). It will now be optimized as part of the “CO₂Tex” project, which is to be funded by the German Federal Ministry of Education and Research (BMBF) so as to enable industrial production in the future. “CO₂Tex” is part of “BioTex Future,” a project initiative of RWTH Aachen University. The initiative is devoted to developing production and processing technologies to facilitate the future market launch of textile systems from bio-based polymeric materials.

Development partners display interest

What makes the CO₂-based TPU fibers so special is their properties: They are elastic and tear-proof and so can be used in textile fabrics. Initial companies from the textile and medical engineering sectors have already tested the CO₂-based fibers and processed them into yarns, socks, compression tubes and tapes.

The aim of launching CO₂-based textiles on the market is to promote a material cycle in the textile and clothing industry based on sustainable resources.

The partners:

About Covestro:

With 2018 sales of EUR 14.6 billion, Covestro is among the world’s largest polymer companies. Business activities are focused on the manufacture of high-tech polymer materials and the development of innovative solutions for products used in many areas of daily life. The main segments served are the automotive, construction, wood processing and furniture, and electrical and electronics industries. Other sectors include sports and leisure, cosmetics, health, and the chemical industry itself. Covestro has 30 production sites worldwide and employed approximately 16,800 people (calculated as full-time equivalents) at the end of 2018.



About Institute of Textile Technology (ITA) at RWTH Aachen University:

The Institute of Textile Technology (ITA) at RWTH Aachen University is involved in the project. The ITA is part of the faculty of Mechanical Engineering at the RWTH and conducts research in the fields of materials, production processes and products for technical applications of textile structures. It has a fully equipped technology center with about 250 textile machines and test benches across all textile process stages from spinning to joining. Furthermore, various laboratories (textile testing, polymer analysis) and workshops are staffed by experts (mechanics, electronic software and hardware).

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