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### **Advanced Fibers by Plasma-Deposited Multilayers**

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Metallised fibres have been a key topic over the last decade in the field of smart textiles. PVD technologies such as magnetron sputtering enable the metallization of fibres at the nanoscale combining electrical conductivity with textile properties – the base for new innovations in textiles. First applications for silver and gold coated fibres included antistatic, low friction and medical products such as embroidered body electrodes for measuring electrocardiogram besides haute couture fashion applications.

Current developments involve hybrid processes like deposition of multilayer coatings on metallised fibres providing additional functionality such as protection/passivation, electrical insulation or adhesion promotion.

Different multilayer coatings on fibres deposited with Physical Vapour Deposition (PVD) and Plasma Enhanced Chemical Vapour Deposition (PECVD) were studied. Ti sputtering (PVD) enables deposition of ultrathin titanium oxides as passivating topcoat. The Ti/Ag interface was investigated for their stability in aqueous environments showing a distinct reduction in Ag release from the Ag-coated fibre surface by maintaining the electrical properties. Semiconductive Ge-based coatings were developed on fibers demonstrating a well-defined temperature sensing effect by a colour change.

PECVD processes yielding a-C:H:O plasma polymer coatings were recently a good candidate to improve the wettability of surfaces. On fibres, the functional plasma polymer film acts to improve adhesion both on uncoated and metallised fibre surfaces for composite materials. Overjacketing of electrical conductive fibres with polymers can be used for data transfer or in general as an electric line. Finally, plasma polymers were also investigated as barrier layers to modulate drug release. Since all processes are continuous (reel-to-reel), plasma technology provides a versatile tool to fabricate fibres with advanced properties.

#### **Keywords**

Plasma processes on fibers

diffusion barrier

silver release

temperature sensing