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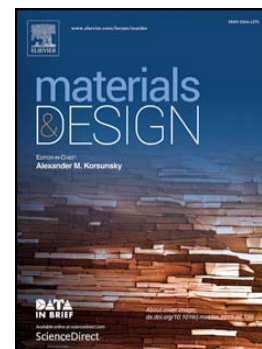
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A novel method for fabricating elastic conductive polyurethane filaments by in-situ reduction of polydopamine and electroless silver plating

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Abstract

A novel and environment-friendly method was presented for fabricating silver plating polyurethane filaments (SPPFs) with high conductivity and excellent elasticity. An adherent polydopamine film was coated on the surface of polyurethane filaments (PFs) by in-situ polymerization reaction of dopamine. Subsequently, the some silver particles and silver plating were reduced on the surface of PFs by in-situ reduction of polydopamine and glucose in turn. The silver particles could be combined on the surface of filaments by the catechol groups of polydopamine. Experimental results show the electrical resistivity of SPPFs can reach the minimum value of $4.5 \pm 0.1 \Omega/\text{cm}$, when the concentration of silver nitrate and dopamine are, respectively, 55 g/L and 3 g/L. The loss of the breaking strength and breaking elongation are, respectively, 5 % and 11.9 %. The nonlinearity error and the hysteresis of SPPF strain sensor are, respectively, less than 29.3 % and 34.3 %. The stretchable flexible SPPFs with high conductivity and excellent elasticity have wide application prospect in many fields, such as wearable electronics, antibacterial, smart textiles, smart garments, and so forth.

Keywords: Polyurethane filament, In-situ reduction, Electroless silver plating, Strain sensor

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