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Abstract

Electrically conductive adhesives as the new materials for Fused Filament Fabrication 3D printing process

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Abstract:
Fused Filament Fabrication (FFF) is the most commonly-used and cost-effective way to produce 3D complex shapes from various thermoplastic polymers and their associated composites. In this work, a new type of the electrically conductive copolyamides were adapted to the FFF process. These copolyamides belong to the group of hot melt adhesives which are a mixture of different components such as polymer base, tackifier, resin, wax, additives and have the low melting point between 100-150C. Here, two types of copolyamides containing 7wt% of multi-walled carbon nanotubes (MWCNTs) were manufactured using twin-screw microextruder. These new filaments possess porosity below 1% and high flexibility without breakage during printing. Although the addition of 7wt% MWCNTs significantly increased the viscosity of the copolyamides, both were printable using the nozzle of 0.6mm and the temperature of around 70C higher than their melting point. Mechanical properties and electrical conductivity of the filaments were evaluated before and after 3D printing. For this, the filaments were printed using Raise3D Pro2D on 5 different temperatures: 205C, 215C, 225C, 235C and 245C. It was found that electrical conductivity is improved with an increase of the nozzle temperature while the tenile strength decreases. Using these thermoplastic adhesives it was possible to print the conductive tracks onto the polymeric fabrics by FFF 3D printing which maintain the conductive properties even during bending.

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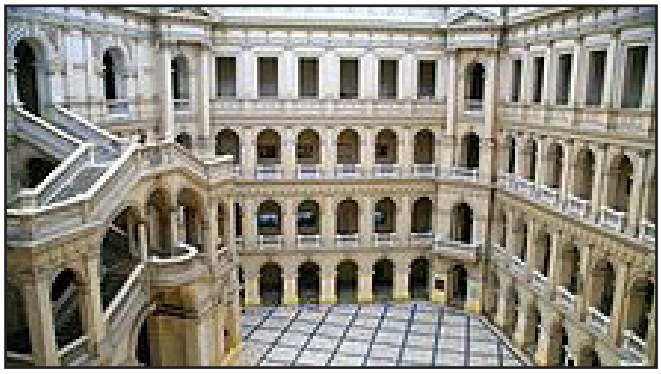
Biography:
Paulina Latko-Duraek graduated from Cracow Univeristy of Technology, Poland (specialization: Polymer Science) and from Fachhochschule Munster, Germany



(specialization: Applied Chemistry) in 2011. She obtained her PhD in 2018 from Warsaw University of Technology, Faculty of Materials Science and Engineering and she worked as a post-doc fellow at Polytechnique Montreal in the group of Prof. Daniel Therriault. Her main interest includes polymer-based composites with electrically conductive properties.

Publication of speakers:

- Paulina Latko-Duraek et al ; Epigenetic-Mediated Downregulation of μ-Protocadherin in Colorectal Tumours , 2015 Apr 20.
- Paulina Latko-Duraek et al ; Intraocular Lens Subluxation in Marfan Syndrome, 2014 Sep 19
- Paulina Latko-Duraek et al ; Evaluation of a residential nutrition rehabilitation center in rural Bolivia: Short-term effectiveness and follow-up results, 2014 Jun2
- Paulina Latko-Duraek et al ; Amyloid Beta, TNF and FAIM-L; Approaching New Therapeutic Strategies for AD, 2014 Dec 18
- Paulina Latko-Duraek et al ; Stability of Antiradical Activity of Protein Extracts and Hydrolysates from Dry-Cured Pork Loins with Probiotic Strains of LAB, 2018 Apr 22

Webinar on 3 D Printing , November 23, 2020; Dubai , UAE.

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