Title (en)

STRONG CONDUCTIVE POLYMER MICROFIBER AND METHOD OF MAKING THE SAME

Title (de)

STARKE LEITENDE POLYMERMIKROFASER UND VERFAHREN ZUR HERSTELLUNG DAVON

Title (fr)

MICROFIBRE POLYMÈRE SEMI-MÉTALLIQUE CONDUCTRICE RÉSISTANTE, PROCÉDÉ ET ACTIONNEURS À VITESSE DE RÉPONSE RAPIDE ET TEXTILES CHAUFFANTS

Publication

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Application

EP 15837134 A 20151203

Priority

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- IB 2015002467 W 20151203

Abstract (en)

[origin: WO2016087945A2] A method comprising: providing at least one first composition comprising at least one conjugated polymer and at least one solvent, wet spinning the at least one first composition to form at least one first fiber material, hot-drawing the at least one fiber to form at least one second fiber material. In lead embodiments, high-performance poly(3,4-ethylenedioxy- thiophene)/poly(styrenesulfonate) (PEDOT/PSS) conjugated polymer microfibers were fabricated via wet- spinning followed by hot-drawing. In these lead embodiments, due to the combined effects of the vertical hot-drawing process and doping/de-doping the microfibers with ethylene glycol (EG), a record electrical conductivity of 2804 S · cm-1 was achieved. This is believed to be a six-fold improvement over the best previously reported value for PEDOT/PSS fibers (467 S · cm-1) and a twofold improvement over the best values for conductive polymer films treated by EG de-doping (1418 S · cm-1). Moreover, these lead, highly conductive fibers experience a semiconductor-metal transition at 313 K. They also have superior mechanical properties with a Young's modulus up to 8.3 GPa, a tensile strength reaching 409.8 MPa and a large elongation before failure (21%). The most conductive fiber also demonstrates an extraordinary electrical performance during stretching/unstretching: the conductivity increased by 25% before the fiber rupture point with a maximum strain up to 21%. Simple fabrication of the semi-metallic, strong and stretchable wet-spun PEDOT/PSS microfibers can make them available for conductive smart electronics. A dramatic improvement in electrical conductivity is needed to make conductive polymer fibers viable candidates in applications such as flexible electrodes, conductive textiles, and fast-response sensors and actuators.

IPC 8 full level

D01D 5/06 (2006.01); **D01D 5/12** (2006.01); **D01D 10/02** (2006.01); **D01F 6/74** (2006.01); **D01F 6/94** (2006.01)

CPC (source: EP US)

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Citation (search report)

See references of WO 2016087945A2

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