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Recent advance in using eco-friendly carbon-based conductive ink for printed strain sensor: A review
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Abstract
Printed electronics specifically printed strain sensor is emerging as a way forward for wearable application because of its flexibility and sustainability. Many efforts have been made to ensure the eco-friendliness of synthesized carbon-based ink to reduce the electronic waste. Carbon based fillers such as carbon nanotube have been widely used because of high electrical conductivity and excellent mechanical properties. However, the production of carbon-based fillers towards the environment still needs to be attended due to the involvement of hazardous fossil-based precursors that may harm the environment. Besides, the involvement of binders such as polyvinyl chloride (PVC), synthetic solvents and additives in the synthesis of the carbon-based conductive ink can impact serious health and environmental issues. Hence, the usage of natural precursors for green synthesis of carbon and the incorporation of biopolymer binder which are environmentally friendly and renewable need to be considered as an alternative to produce eco-friendly conductive ink. This review article presents the progress in green synthesis of the carbon-based filler, recyclability of the ink and material selection for the ink composition from biopolymer binder, solvent and additives that are eco-friendly. The performances of the carbon-based conductive ink are discussed in terms of the percolation theory and tunneling effect that form the conductive pathway in microscopic level in stretching and relaxing phenomena for printed strain sensor applications. The rheological properties of the printed ink such as viscosity, surface tension and adhesion properties to the chosen substrate also plays crucial role depending on the chosen printing technique of the printed strain sensor. The highlight of this paper is it also correlates the performance of the printed strain sensor in terms of its sensitivity using different eco-friendly carbon-based conductive ink with different printing techniques. © 2024

Author Keywords
Biopolymer binder; Carbon conductive ink; Eco-friendly; Printed strain sensor; Printing technique; Sensitivity

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