

## Accepted Manuscript

Title: Cellulose and Nanocellulose-Based Flexible-Hybrid Printed Electronics and Conductive Composites – A Review

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PII: S0144-8617(18)30699-4  
DOI: <https://doi.org/10.1016/j.carbpol.2018.06.045>  
Reference: CARP 13719

To appear in:

Received date: 1-5-2018  
Revised date: 2-6-2018  
Accepted date: 11-6-2018

Please cite this article as: Agate S, Joyce M, Lucia L, Pal L, Cellulose and Nanocellulose-Based Flexible-Hybrid Printed Electronics and Conductive Composites – A Review, *Carbohydrate Polymers* (2018), <https://doi.org/10.1016/j.carbpol.2018.06.045>

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# Cellulose and Nanocellulose-Based Flexible-Hybrid Printed Electronics and Conductive Composites –A Review

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## Highlights:

- Significant market opportunities for biopolymers in flexible-hybrid printed electronics.
- High smoothness and transparency can be achieved with TEMPO oxidation/nanocellulose.
- Dielectric properties of cellulose are controlled with moisture management.
- Doping or ionizable grafting is required for conductivity in cellulose.
- Grafted negative charged side chains on cellulose can help in positive ion conduction.
- Nanocellulose shows piezoelectric properties due to crystalline asymmetry.

## ABSTRACT

Flexible-hybrid printed electronics (FHPE) is a rapidly growing discipline that may be described as the precise imprinting of electrically functional traces and components onto a substrate (such as paper) to create functional electronic devices. The mass production of low-cost devices and

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