



- 1 *Printable aqueous and organic dispersions of graphene oxide (GO) and chemically converted graphene (CCG).*
- 2 *Lamellar structure of synthesized CCG.*
- 3 *Printed thermoelectric generator for Energy Harvesting made of Ag – PEDOT:PSS/CCG.*

GRAPHENE-BASED MATERIALS FOR FUNCTIONAL PRINTING

Printable functional graphene-based materials with special electrical, thermal, mechanical or optical properties were developed and formulated by Fraunhofer IFAM in cooperation with University of Bremen. These new materials can replace the current existing transparent semiconductor materials (ITO) or offer new application routes.

resistance of $\sim 0,4 \text{ k}\Omega$ with layer thicknesses of $1 - 2 \text{ }\mu\text{m}$.

Applications

The functional materials can be used either as inks in Inkjet or Aerosol Jet, or as a paste in dispenser, screen or pad printing processes on flat substrates, such as foils or components.

These novel functional materials can be used in

- microelectronic applications,
- for displays,
- in photovoltaics or
- in solid state batteries and
- in thermoelectric generators.

Inks and pastes

Preparation of graphene-based structures (chemically converted graphene CCG) proceeds through a chemical way from graphite oxide (GO) by reduction either during ink formulation or after the printing process. This approach offers the opportunity to create printable graphene-based nanostructures, metal or polymer-containing composite materials for customized application scenarios. Graphene-like structures printed at the Fraunhofer IFAM achieve an actual sheet

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