Leibniz-Institut
für Polymerforschung
Dresden

DRESDEN concept

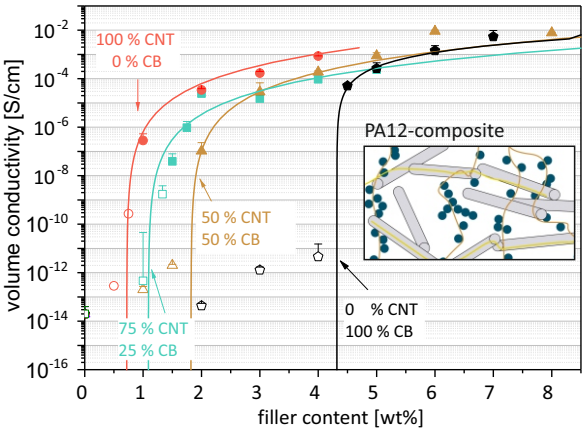
Leibniz Gemeinschaft

Electrically conductive thermoplastic composites and blends with nanoscale fillers

Focus areas

- Incorporation of carbon nanomaterials in thermoplastic polymers and multiphase polymer blends via melt compounding in the small or laboratory scale
- Optimization of recipe and melt processing conditions (temperature, rotation speed, throughput, residence time) with consideration of the targeted property profiles
- Quantification of the filler dispersion in the composite using LM (Light microscopy), SEM (Scanning electron microscopy) and TEM (transmission electron microscopy)
- Determination of the electrical, thermoelectric and thermal conductivity as well as rheological and mechanical properties of composites and blends

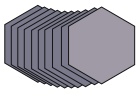
Electrical conductivity of composites with various fillers and their mixtures



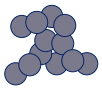
Multifunctional carbon-based nanomaterials

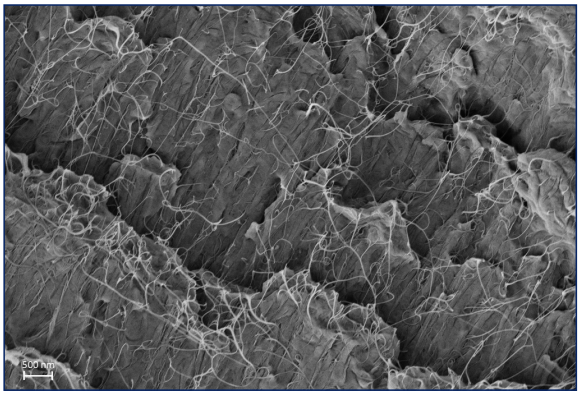
- excellent electrical and mechanical properties as additives for the modification of polymer materials
- carbon nanotubes (CNTs)

- graphite, graphene or graphite nanoplatelets (GNP)



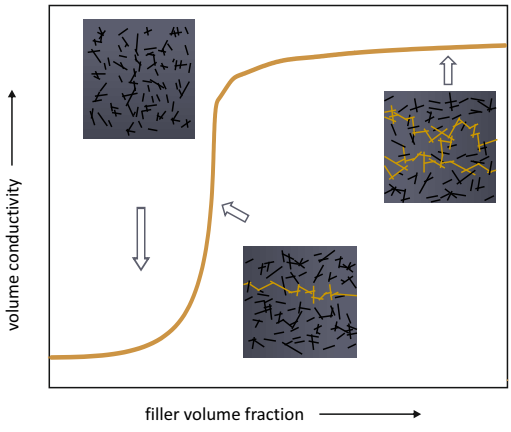
- high structured electrical conductive carbon black

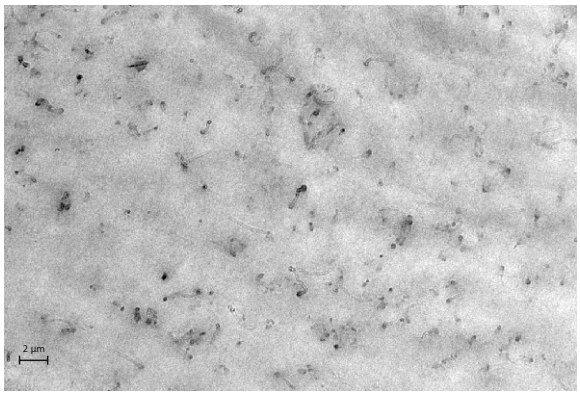




SEM: PA / 5 wt% SWCNT

Electrical percolation

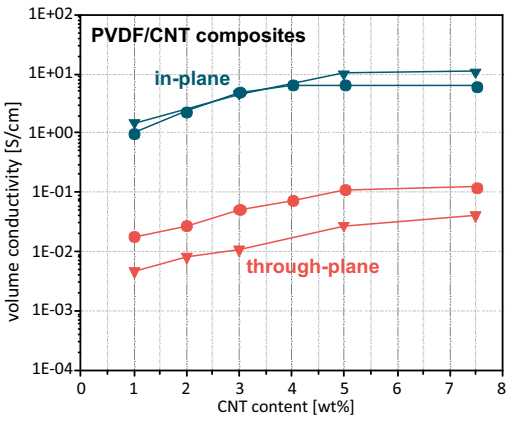


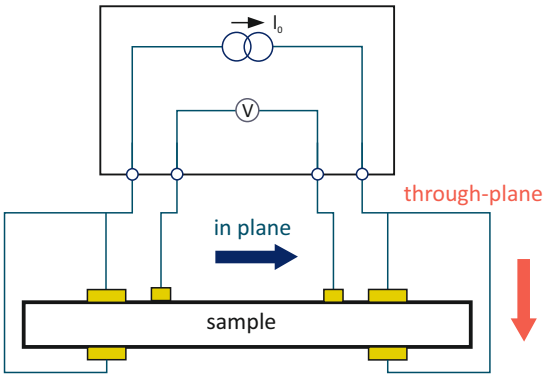


TEM: PA / 1 wt% MWCNT

Temperature and direction-dependent resistivity measurement up to 100°C

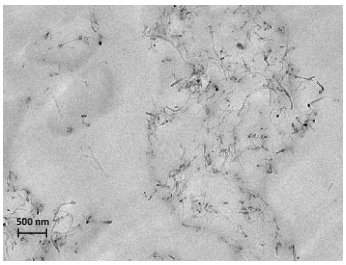
The orientation especially of anisotropic fillers in plate-shaped samples or films can be characterized by direction-dependent resistance measurements.



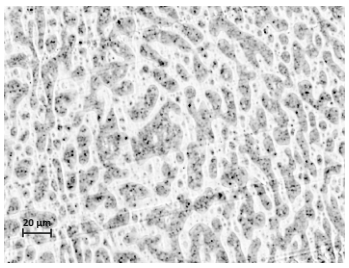


Measurement of electrical resistivity in two directions

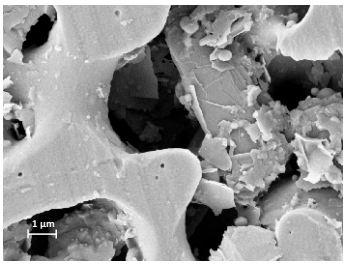
Selective localization of fillers in blends



TEM: PC/SAN/MWCNT blend



LM: PC/SAN/MWCNT blend; MWCNTs in PC component



SEM: PC/SAN/GNP blend (PC dissolved out)

References

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