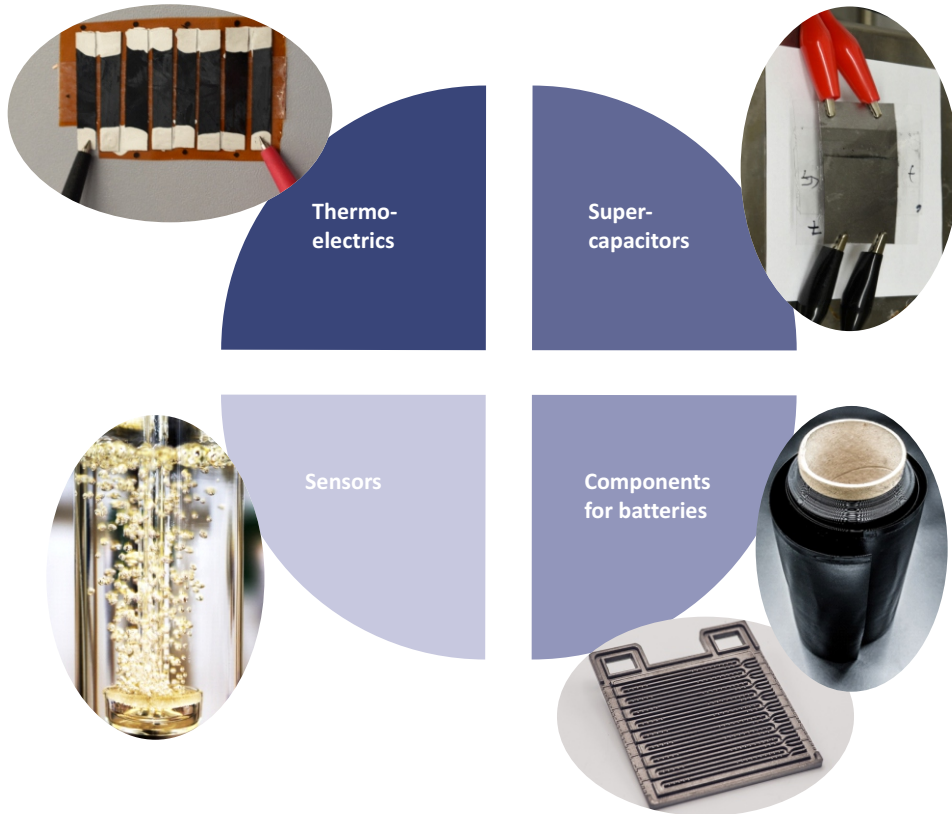
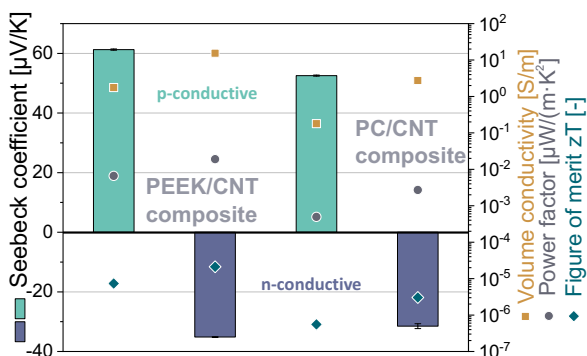
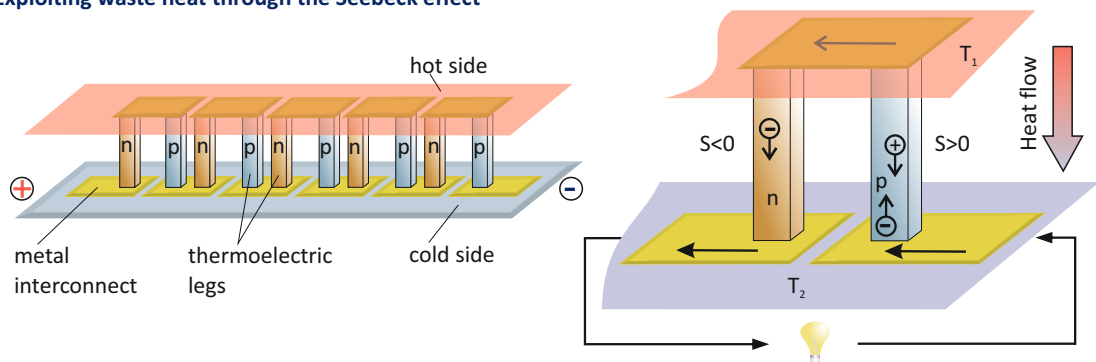


# Research topics of the Department Functional Nanocomposites and Blends



## Thermoplastic composites with carbon nanotubes as thermoelectric materials Exploiting waste heat through the Seebeck effect



### Advantages / disadvantages to conventional materials:

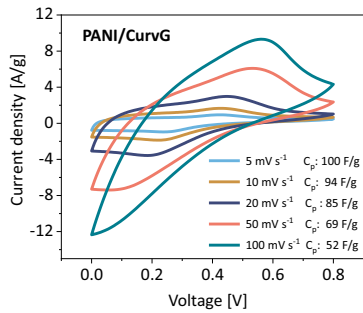
- + Wide variety of designs
- + Low weight and cost
- + Recyclable, non-toxic, without geopolitical risk
- Low thermoelectric efficiency
- Limited temperature range: -20°C to +240°C

## Electrode materials for supercapacitors

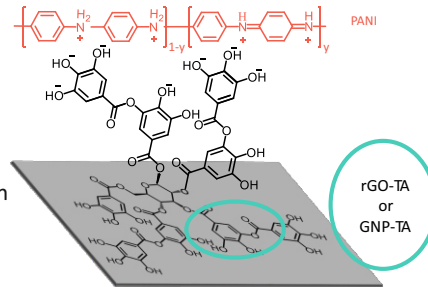
### Environmentally friendly synthesis strategies

Tannin (TA) as reducing agent and emulsifier in PANI/graphite derivatives electrode materials

### Durable high power electrodes



- High cycle stability
- High charging and discharging speed
- High energy and power density
- Printable pastes for screen printing and roll-to-roll printing for electrode preparation

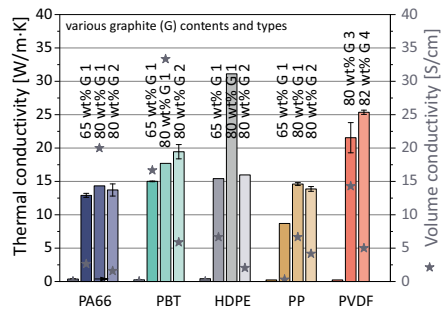


## Highly conductive polymer composites

### Graphite based composites

Recipe development of polymer/graphite-based materials for the use

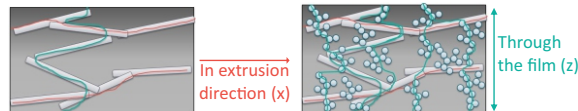
- as bipolar plates in fuel cells or redox flow batteries and
- as plates in plate heat exchangers



### Conductive films for bipolar batteries

Recipe development of electrical conductive polymer based films as an alternative to aluminium foils used so far in large-format planar bipolar batteries

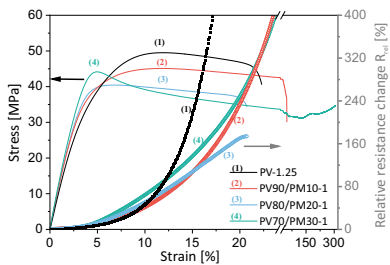
Filler orientation in melt extruded films:



## Conductive polymer composite sensors

### Strain sensor

PVDF/PMMA/CNT blend composites, variation of blend composition

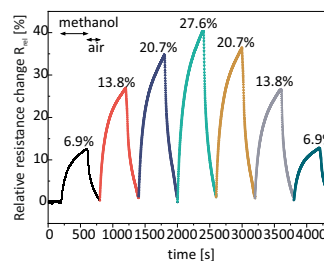


### Design principles for composites:

- Blend formation
- Interfacial interactions
- Phase separation
- Hybrid filler systems
- Segregated filler networks

### Gas sensor

Cellulose composite with reduced graphite oxide, methanol quantification



## Contact

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