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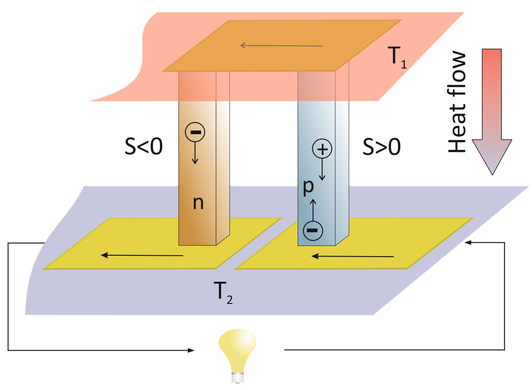
Thermoelectric properties achievable with CNTs and polymer/SWCNT composites

Beate Krause, Petra Pötschke
Leibniz-Institut für Polymerforschung Dresden e.V., Dresden, Germany

Thermoelectricity (TE) is the interdependence of temperature and electricity. If different temperatures are applied to the ends of an electrically conductive material, a potential difference arises which is defined as a thermoelectric voltage. The German physicist THOMAS JOHANN SEEBECK first described this effect in 1823.

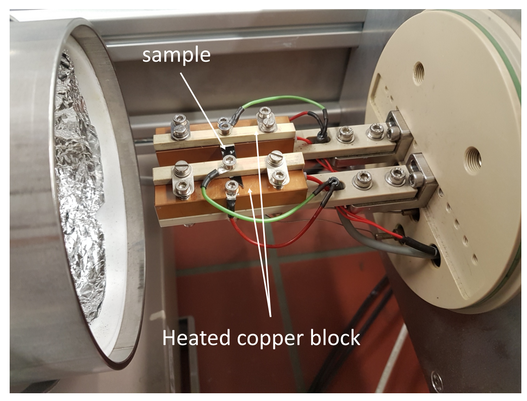
Photo: S. Döring



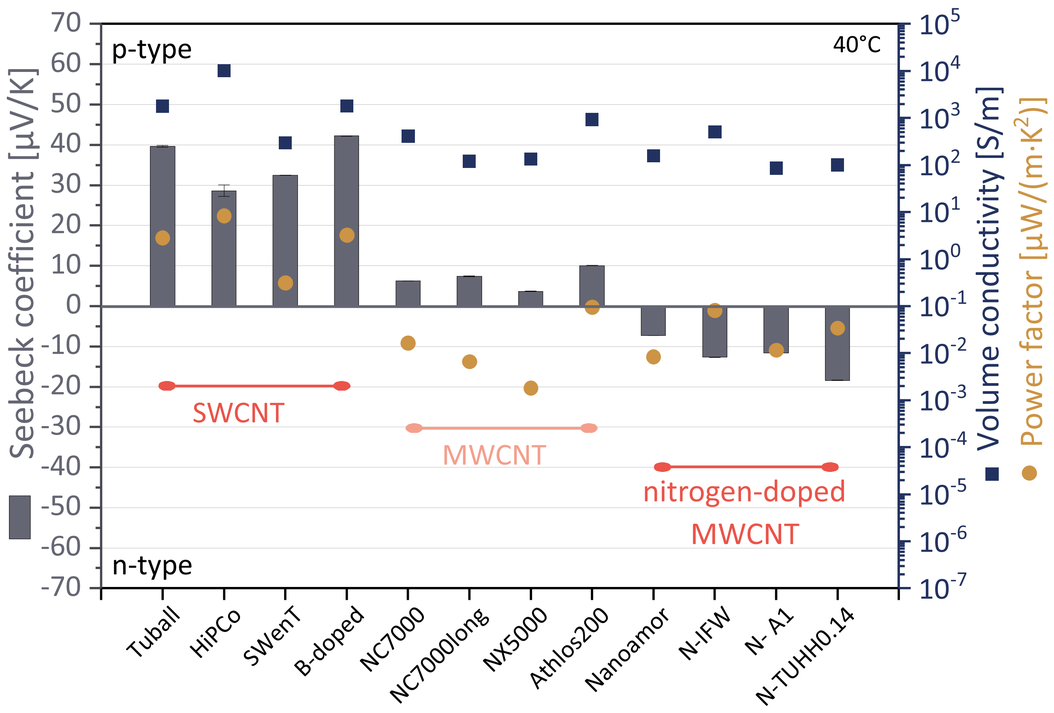
S = Seebeck coefficient
PF = Power factor
U = Thermovoltage
σ = Volume conductivity
T = Temperature
ZT = Figure of merit
κ = Thermal conductivity

$$S = \frac{U}{\Delta T} \qquad PF = S^2\sigma \qquad ZT = \frac{S^2\sigma}{\kappa}\,T$$

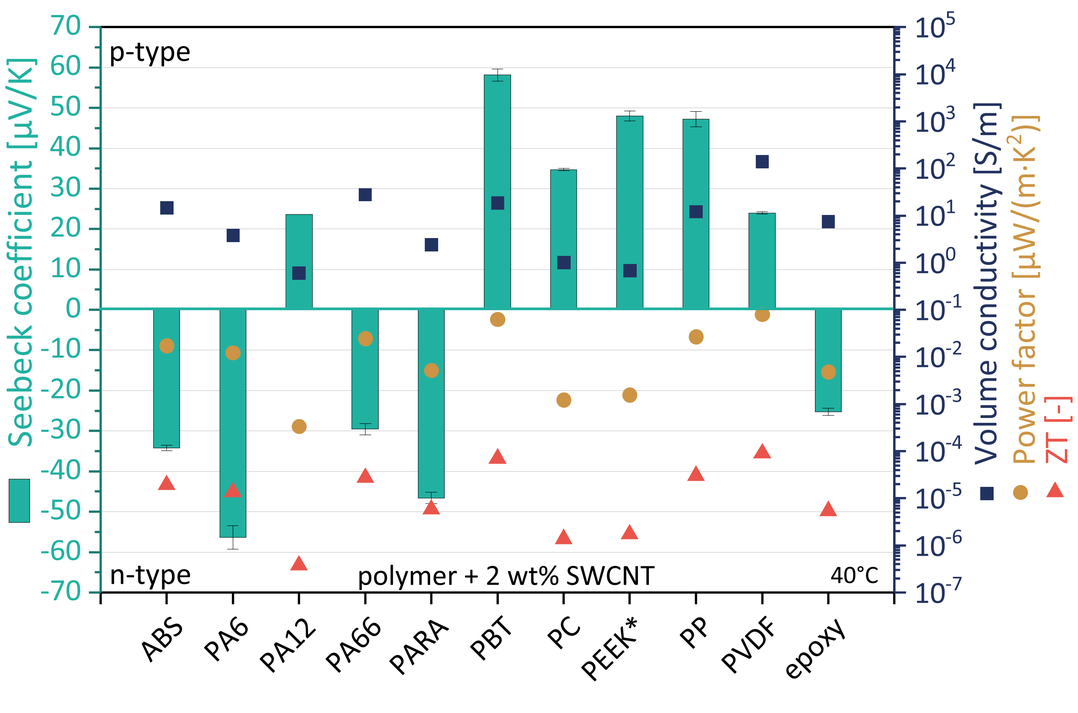
In-house development of a measuring stand for simultaneous measurement of thermoelectric voltage and electrical resistivity [1]



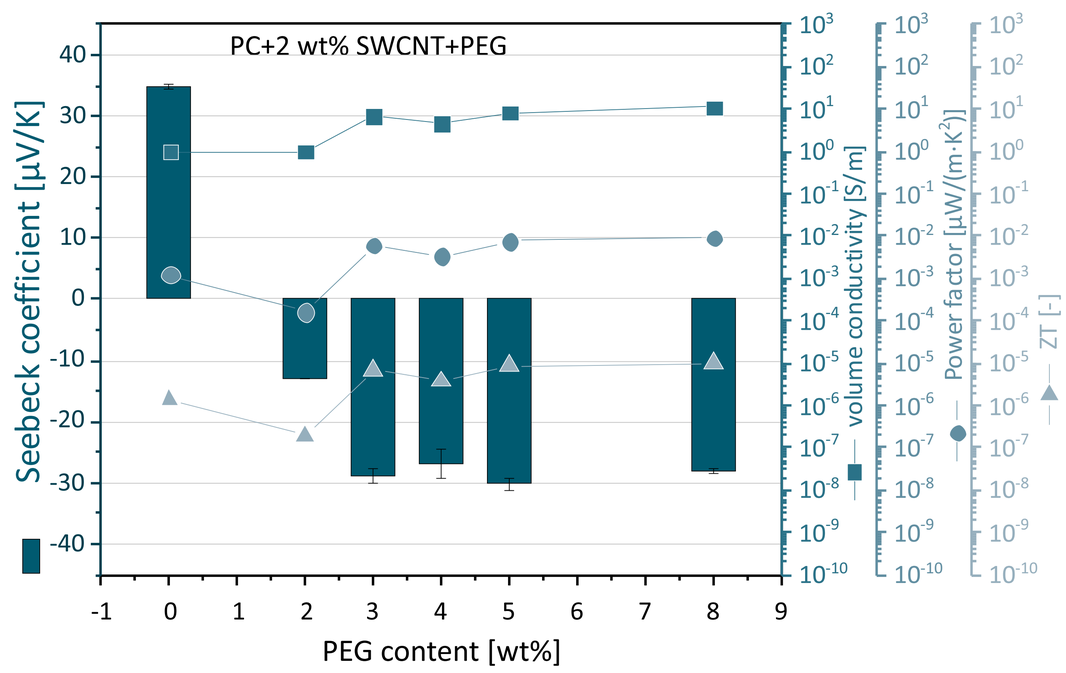
Carbon nanotube (CNT) powders: TE performance is strongly dependent on the CNT type [2-5]



Polymer/SWCNT composites: The polymer type influences whether p- and n-type behaviour occurs [2-6]

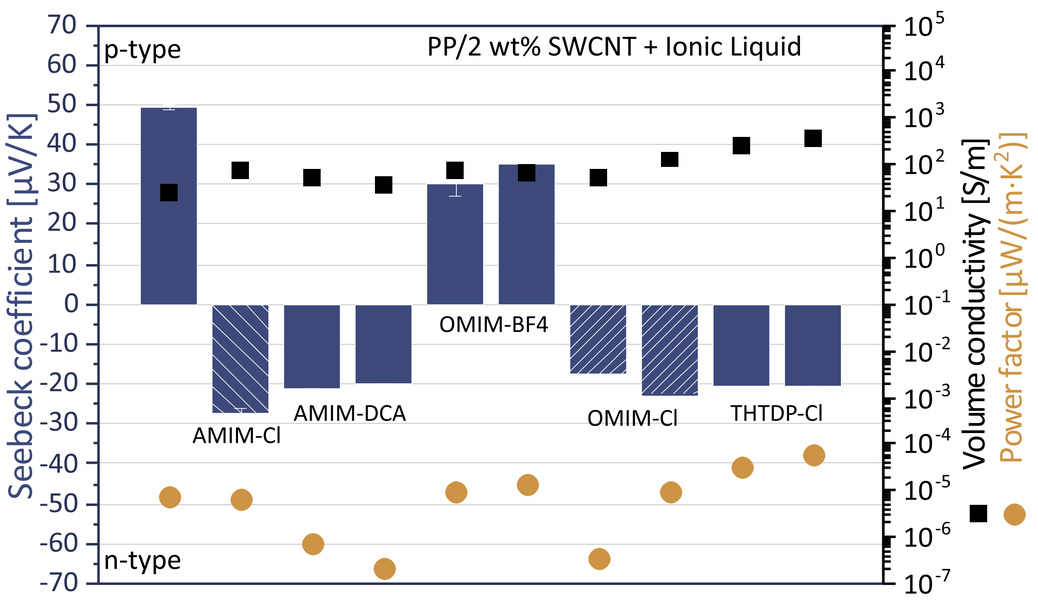


Polymer/SWCNT composites with polyethylene glycol (PEG) to achieve n-type behaviour [6]



For SWCNT composites based on PBT [6], PEEK [6] or PP [7], the addition of PEG leads also to n-type behaviour

Polymer/SWCNT composites with ionic liquids (IL) to achieve n-type behaviour [8]



For PC- and PEEK/SWCNT composites, the addition of Ionic liquid THTDP-Cl leads also to n-type behaviour [9]

contact
Dr. Beate Krause

References

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