

The Prospects of Nanotechnology in Electrical Power Engineering

C. Sumereder, M. Muhr

ABSTRACT

Nanotechnology is one of the fastest growing fields in research and technology. The main interest of nanotechnology is not electrical power engineering but there were a lot of possible applications to improve electrical, mechanical, thermal or chemical properties of electric power equipment. Often the economic aspect is pointed out, but also a higher efficiency or a reduction of losses predicts this new technology a successful appearance in power engineering.

Improvements of Nanotechnology

- * Metallic conductors
- * Electric insulation properties
- * Optimization of design
- * Reduction of used material, higher reliability
- * Electromagnetic compatibility (EMC)
- * Elongation of life-time period and long-term efficiency

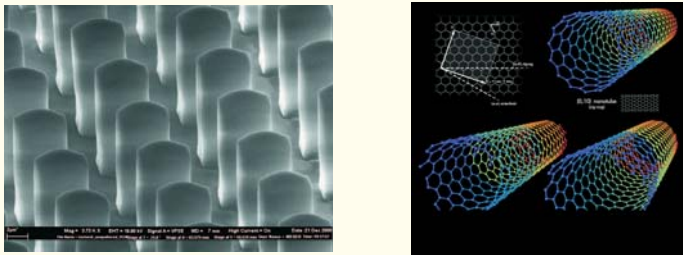


Figure 1: Carbon Nano Tubes [1], [2]

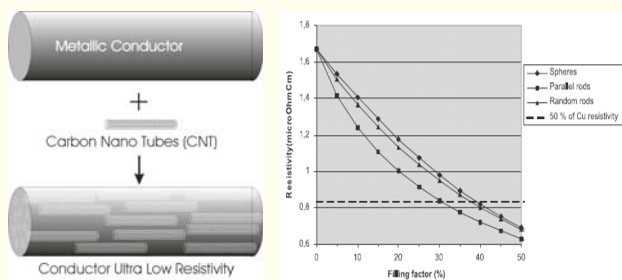


Figure 2: Conductor of Ultra Low Resistivity [3]

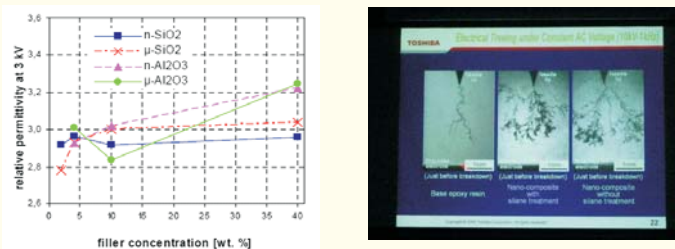


Figure 3: Properties of Electric Insulants: Thermal Conductivity, Breakdown Resistance, Relative Permittivity,... [4], [5]



Figure 4: Hydrophoby, Definition Contact Angle

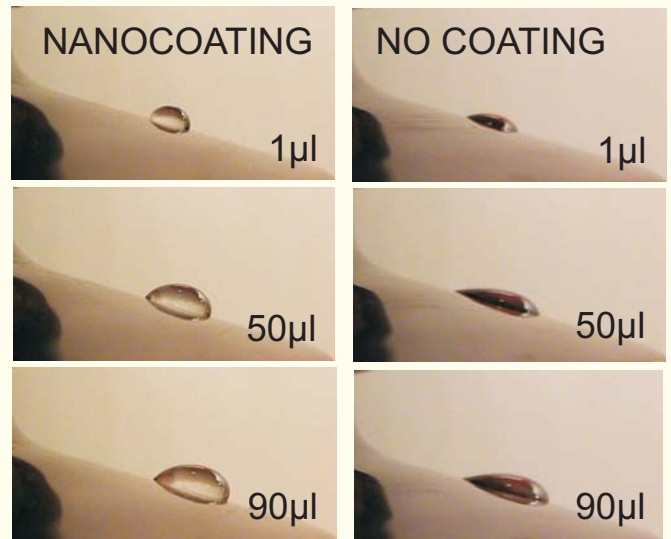


Figure 5: Improvement of Ceramic Insulator Surface with Nano-Coating vs. Surface without Coating

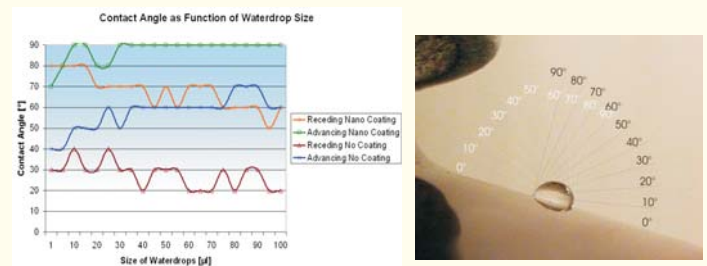


Figure 6: Results of Ageing Test and Procedure of Contact Angle Measurement

References

- [1] Ingenieur Wissenschaft Jahresmagazin, <http://www.institut-wv.de/2244.html>
- [2] http://de.wikipedia.org/wiki/Bild:Types_of_Carbon_Nanotubes.png
- [3] O. Hjortstam, P. Isberg, S. Söderholm, and H. Dai: Can we achieve ultra-low resistivity in carbon nanotube-based metal composites?, Applied Physics A, Vol. 78, No. 8, 2004
- [4] S. Rätzke, J. Kindersberger: Erosion Behaviour of Nano Filled Silicone Elastomers, ISH 2005, paper C09
- [5] ISEIM 2005, Takahiro Imai, Fumio Sawa, Tamon Ozaki, Toshio Shimizu: Evaluation of Insulation Properties of Epoxy Resin with Nano-Scale Silica Particles