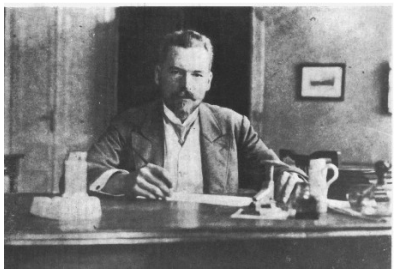

Contribution ID: **5** Type: **Invited talk**

Nano-wire based transparent electrodes: a mean-field approach

Monday, 27 September 2021 12:00 (30 minutes)

Transparent electrodes are important components of modern optoelectronic devices such as touch-screens, heaters, and solar cells. One of the most widely used kinds of transparent electrode consists of a transparent, poorly conductive film containing randomly distributed highly conductive fillers such as nanowires, nanotubes, nanorods, and nanorings.
Using a mean-field approach, we evaluate the electrical conductivity of two-dimensional systems with rodlike and ringlike conductive fillers (wires). The concentration of fillers is supposed to be significantly higher than the percolation threshold. Instead of considering a random resistor network produced by all conductive fillers, we study one filler in the mean field generated by all other conductive fillers. Three limiting cases are of our specific interest, i.e., wire-resistance dominated regime, junction-resistance dominated regime, and equal wire and junction resistances.
We compare the electrical conductivity obtained within our mean-field approximation with the results of direct computations of the underlying random resistor networks as well with the analytical evaluations of other authors [1,2].
1. Kumar, N. S. Vidhyadhiraja, and G. U. Kulkarni, Current distribution in conducting nanowire networks, J. Appl. Phys. 122, 045101 (2017).
2. C. Forró, L. Demkó, S. Weydert, J. Vöoröos, and K. Tybrandt, Predictive model for the electrical transport within nanowire networks, ACS Nano 12, 11080–11087 (2018).

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