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Thermally activated charge transport in printed silicon networks

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Abstract content
   (Max 300 words)

The uniqueness of charge transport in printed silicon nanoparticle networks is fully described. The charge transport is characterised by hopping and percolation. The activation energies for conduction were determined from variable temperature conductance measurements over a temperature range of 15K to 345K. Silicon printed from milled nanoparticles showed different activation energies from devices printed from silicon nanoparticles produced by chemical vapour synthesis. The activation energies for charge transport correlate with the morphology and arrangement of particles constituting the networks. The effective area of contact between particles and clusters is demonstrated to be the limiting factor for charge transport. The printed silicon displays a negative temperature coefficient of resistance which can be explained in terms of carrier excitation over interface barriers as confirmed by variable temperature Hall effect experiments. The importance of this understanding is demonstrated in the use of printed silicon as negative temperature coefficient temperature sensors.

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yes

Level for award
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PhD

Main supervisor (name and email)
and his / her institution

Prof. D.T. Britton

Would you like to
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no

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