

Synthesis of Ag and Ni nanowire networks for application in multifunctional, programmable materials.

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Random nanowire networks have drawn attention in the last few years because of their potential use in nanostructured electronic materials. The natural connectivity behaviour found in random nanowire networks presents a new paradigm for creating multi-functional, programmable materials [1]. Long wires with small diameters can form a more effective network with smaller wire number density by providing longer percolation paths and reducing the inter-nanowire junctions where the major contact resistance drop occurs [2]. To obtain long wires with small diameters two methods was used: chemical nanowire synthesis in solution and electrochemical deposition in anodized aluminium oxide template.

Nickel nanowires was synthesised in an AAO membrane to control the diameter and length of the nanowires. Optimal conditions for AAO membrane formation and nickel electrodeposition was found. In this study monocrystalline a nickel nanowires with nanowire diameter ~60 nm was obtained.

Free growing silver nanowires was obtained using chemical solution-based method. Optimal growth temperature and rate was determined. Monocrystalline silver nanowire network with nanowire lengths of up to 100 μm and nanowire diameters of ~60 nm were obtained.

References

1. A. T. Bellew, et al. *Nanoscale*. **6**, 9632 (2014)
2. J. Jiu, et al. *Mater. Chem. A*. **2**, 6326 (2014)

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