

Synthesis and Processing of Metal Nanowires

Boris Polyakov¹, Sergey Vlassov¹, Leonid Dorogin^{2,3}, Jelena Butikova¹, Mikk Antsov^{2,3},
Roberts Zabels¹, Runno Lõhmus^{2,3}

¹ Institute of Solid State Physics, University of Latvia, Riga, Latvia

² Institute of Physics, University of Tartu, Tartu, Estonia ³ Estonian Nanotechnology Competence Centre, Tartu, Estonia

e-mail: boris@cfi.lu.lv

Recently, metal nanowires have attracted attention of a broad audience due to numerous applications of these novel materials. One of the most promising applications of metal nanowires is fabrication of transparent flexible electrodes. As it is already known, silver and copper are the best metals for wires and electrodes, and nanowires make possible using them for transparent electronics as well.

However, nanomaterials are strongly affected by environmental factors. For example, copper nanowires react with atmospheric moisture, and in several days nanowire surface is coated by copper oxide (see Figure), but under longer exposure to ambient humidity whole copper nanowire transforms into copper oxide. In order to protect nanowires from atmospheric influence, nanowires can be coated with compact silica layer (see Figure).

In flexible electrodes, as well as various nanoelectromechanical systems (NEMS) like, e.g., nanorelays, nanoswitches and nanoresonators, nanowires should withstand numerous repetitive deformations [1]. We have found that silica coating of metal nanowires significantly improves their mechanical properties (increases fracture resistance and prevents cracks formation) [2].

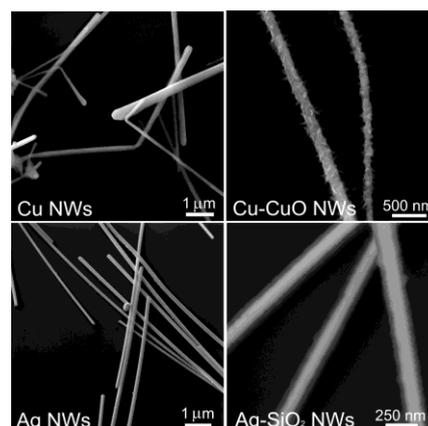


Figure. Scanning electron microscope images of Cu, Cu-CuO, Ag, Ag-SiO₂ nanowires

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References

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