Controlled Synthesis of Nanowires/Nanorods via Electrodeposition in Anodisc Alumina Templates

Monika Nehra[1,2]*, Deepak Kedia[1], Neeraj Dilbaghi[2], Ki-Hyun Kim[3], Sandeep Kumar[2,3]

[1]Department of Electronics and Communication Engineering, Guru Jambheshwar University of Science and Technology, Hisar-Haryana, 125001, India; [2]Department of Bio and Nano Technology, Guru Jambheshwar University of Science and Technology, Hisar-Haryana, 125001, India; [3]Department of Civil & Environmental Engineering, Hanyang University, 222 Wangsimni-Ro, Seoul 04763, Republic of Korea

**Presenting authors: ssmonikanehra@gmail.com*

Abstract

The remarkable advances in nanotechnology offered its integration in diverse fields of science and engineering. The physicochemical properties of nanomaterials can be modified depending upon the size as well as their morphology. The electrochemical deposition technique offers accurate process control for growth of different nanostructures for a variety of materials. The different parameters and operating conditions can be optimized for electrodeposition of highly-ordered nanowires/nanorods inside the pores of anodisc template such as electrodeposition potential, time durations, and pH and concentration of the solution. Here, well-aligned and highly ordered Ni nanowires have been synthesized using template-assisted electrochemical deposition technique. The growth of Ni nanowires/nanorods at different stages of pore filling was examined via electrochemical measurements. Such monitoring helps in finding the optimal conditions to grow uniform nanowires or nanorods without any imperfections or irregularities. This mechanism opens up new opportunities to fabricate several interesting nanostructures depending upon the growth mechanism and associated parameters. Different microscopic and spectroscopic techniques have been utilized to investigate the optical, morphological, and crystalline properties of the Ni nanowires. The synthesized nanostructures are proposed to be utilized in energy, environment, and healthcare applications.