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Fabrication of nanowire-nanotube hybrid arrays in porous aluminum oxide membranes ZUXIN YE, HAIDONG LIU, ISABEL SCHULTZ, WENHAO WU, D. G. NAUGLE, I. LYUKSYUTOV, Texas A & M University — Fabrication of ordered nanowire-nanotube hybrid arrays embedded in porous anodic aluminum oxide (AAO) membranes is demonstrated. Arrays of TiO_2 nanotubes were first deposited into the pores of AAO membranes by an electroless sol-gel technique. For subsequent electrochemical deposition of Co nanowires into the TiO_2 nanotubes, a thick Au layer was first evaporated on one surface of the membrane to serve as the cathode. Co nanowires were then electrochemically deposited into the TiO_2 nanotubes through the other surface to form the hybrid nanowire-nanotube arrays. SEM and TEM measurements showed a high Co nanowire filling factor and a clean interface between the Co nanowires and the TiO_2 nanotubes. The TiO_2 nanotubes were found to be composed of nanometer sized TiO_2 crystals, while the Co nanowires were polycrystalline with Co crystal size comparable to the nanowire diameter. This technique can be extended to the fabrication of hybrid arrays of various materials. This work was supported by DOE No. DE-FG02-07ER46450, NSF No. DMR-0606529, and the Robert A. Welch Foundation A-0514.

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