

FACULTY GRANTS COMMITTEE REPORT FORM

Name: Jeremiah K.N. Mbindyo

Department: Chemistry

Title of Grant: Metal Nanocatalysts for Renewable Energy

Date of Award (e.g. Fall 1998): Spring 2013

Category of Award (e.g. Released-time): Research

Amount of Award: 595.80

Amount Encumbered: 595.80

REPORT

(150 words) An abstract of a presentation or a report of a manuscript can be substituted and attached where appropriate.

The goal of the study was to investigate the catalytic activity of electrochemically synthesized nickel nanowires functionalized via galvanic replacement to incorporate a surface layer of Au. Metallic nanostructures are of great interest as heterogeneous catalysts due to their high surface area. Au-Ni nanorods were synthesized by a combination of template-assisted synthesis and galvanic replacement. Nickel was first electrodeposited by controlled potential electrolysis (CPE) in a porous alumina template coated with Ag on one side. Free standing nanorods were obtained by dissolving the Ag in 50% HNO₃ and the membrane in 2 M NaOH. Au was deposited on the Ni nanorods through a galvanic replacement reaction with 6 mM HAuCl₄. Preliminary studies show significant differences in the reduction of 2-nitroaniline by Ni and Au nanorods, indicating that this reaction could be a suitable model system for investigating the relative catalytic activity of the heterometallic nanocatalysts.