

Accepted Manuscript

Nanoporous gold reinforced with carbon based nanomaterials: A molecular dynamics study

Deniz Ezgi Gulmez, Yunus Onur Yildiz, Mesut Kirca



PII: S1359-8368(18)30609-7

DOI: [10.1016/j.compositesb.2018.06.006](https://doi.org/10.1016/j.compositesb.2018.06.006)

Reference: JCOMB 5736

To appear in: *Composites Part B*

Received Date: 23 February 2018

Revised Date: 28 May 2018

Accepted Date: 4 June 2018

Please cite this article as: Gulmez DE, Yildiz YO, Kirca M, Nanoporous gold reinforced with carbon based nanomaterials: A molecular dynamics study, *Composites Part B* (2018), doi: 10.1016/j.compositesb.2018.06.006.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Nanoporous Gold Reinforced with Carbon Based Nanomaterials:

A Molecular Dynamics Study

Deniz Ezgi Gulmez, Yunus Onur Yildiz, Mesut Kirca *

Department of Mechanical Engineering, Istanbul Technical University, 34437 Istanbul, Turkey

* Corresponding Author

Address: Department of Mechanical Engineering

Istanbul Technical University

Inonu Cad. No:65 34437

Gumussuyu, Istanbul, Turkey.

Tel: +90 (531) 215 86 40

Fax: +90 (212) 249 51 97

E-mail: kircam@itu.edu.tr

Abstract

Considering the fact that carbon based nanostructures (CBNs) and nanoporous (np) metals are very promising for future applications, the main motivation of this study is to improve the mechanical characteristics of np metals by employing CBNs including graphene nanoribbons (GNRs), fullerenes and CNTs within the cellular voids by presenting a new metal-carbon nanocomposite material. For this purpose, a Voronoi-based atomistic modeling technique is used to obtain numerical models of the proposed hybrid structures and their mechanical properties under tensile and compressive loading conditions are investigated by classical molecular dynamics. Instead of reinforcing with discrete units, a heat welding procedure is applied to generate a covalently bonded network of carbon based structures. Results clearly indicate that the utilization of carbon based nanostructures enhances both tensile and compressive response of np metals significantly while a minor microstructural change is observed within the crystal structure. The major effect is observed especially on the yield and post-yield behavior of np structures, while the elastic modulus is not affected remarkably. The main reason for the enhancement is greatly attributed to the covalent bonding generated

Download English Version:

<https://daneshyari.com/en/article/7211812>

Download Persian Version:

<https://daneshyari.com/article/7211812>

[Daneshyari.com](https://daneshyari.com)