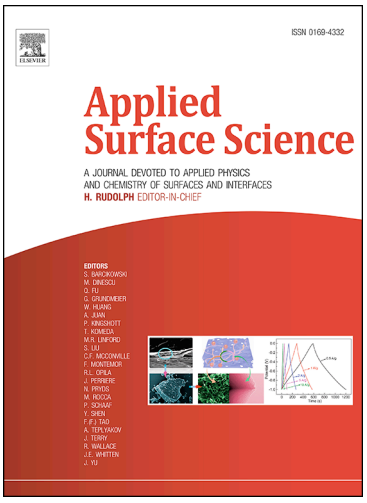

Full Length Article

LIPSS with gold nanoclusters prepared by combination of heat treatment and KrF exposure

Dominik Fajstavr, Petr Slepička, Václav Švorč ík

PII: S0169-4332(18)32592-3
DOI: https://doi.org/10.1016/j.apsusc.2018.09.167
Reference: APSUSC 40471

To appear in: *Applied Surface Science*

Received Date: 7 July 2018
Revised Date: 12 September 2018
Accepted Date: 20 September 2018

Please cite this article as: D. Fajstavr, P. Slepička, V. Švorč ík, LIPSS with gold nanoclusters prepared by combination of heat treatment and KrF exposure, *Applied Surface Science* (2018), doi: https://doi.org/10.1016/j.apsusc.2018.09.167

LIPSS with gold nanoclusters prepared by combination of heat treatment and KrF exposure

Dominik Fajstavr[a], Petr Slepička[a], Václav Švorčík[a]

[a]*Department of Solid State Engineering, The University of Chemistry and Technology, 166 28 Prague, Czech Republic*

Abstract

In this study, gold enhanced laser induced periodic surface structures (LIPSS) were prepared on polyethersulphone (PES) substrate. We introduce here new easy method how to prepare periodic structures with gold nanoparticles incorporated into the polymer bulk. This metal-polymer composite samples can be useful materials in microelectronic industries merging both conductive and flexible properties. Gold nanoparticles were sputtered on PES polymer and than thermally annealed. Following surface modification was carried out by polarized KrF laser beam with laser fluence of 4-28 $mJ \cdot cm^{-2}$ and number of pulses up to 6000. The surface morphology of modified samples were analysed with atomic force microscopy and scanning electron microscopy with focused ion beam. For determination of elemental composition we used the X-ray photoelectron spectroscopy and energy dispersive X-ray spectroscopy. This research is focused on roughness and surface chemistry study in laser modified area, where enhanced LIPSS with incorporated noble nanoparticles were fabricated. Measurements of modified samples confirmed gold concentrations in LIPSS both on surface and in ripple volume, this unique constructed pattern makes this simple method a new way to prepare suitable material for SERS substrate or also as other biosensor application.

Keywords:

**) Corresponding author: P. Slepička, tel. +420 220 445 162; E-mail address:* petr.slepicka@vscht.cz