

Dark-field microspectroscopy of single all-optical nanoswitch using gold nanosandwich with $\text{Ge}_2\text{Sb}_2\text{Te}_5$ phase change medium

Takashi Hira, Takashi Honma, Takayuki Uchiyama, Toshiharu Saiki

Graduate School of Science and Technology, Keio University, 3-14-1 Hiyoshi, Kohoku, Yokohama, Kanagawa 223-8522, Japan
hira@saiki.elec.keio.ac.jp

Abstract

LSPR switching of single gold nanorod was confirmed by dark-field microspectroscopy and scattering intensity acquisition. Recently, all-optical switching repetition of single nanostructure¹ was proved by microspectroscopy in previous work.

In this work, effective design to enhance the influence of refractive index changing of surrounding medium was prepared by sandwiching $\text{Ge}_2\text{Sb}_2\text{Te}_5$ thin layer between Au nanorod and Au thin layer. (Fig.1)

FDTD simulation (Fig.2) revealed the existence of effective switching modes with large E-field penetration through active medium.

The scattering intensity at 980nm was acquired (Fig.3) and repeatability of switching was confirmed.

Microspectroscopy was performed and assigned to FDTD simulation.

References

[1] T. Hira, T. Homma, T. Uchiyama, K. Kuwamura and T. Saiki
Appl. Phys. Lett. 103 (2013) 241101

Figures

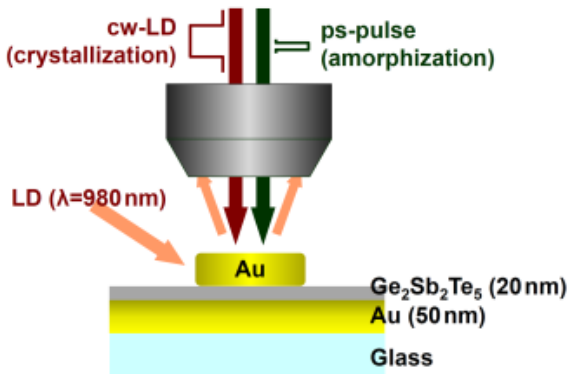


Fig.1

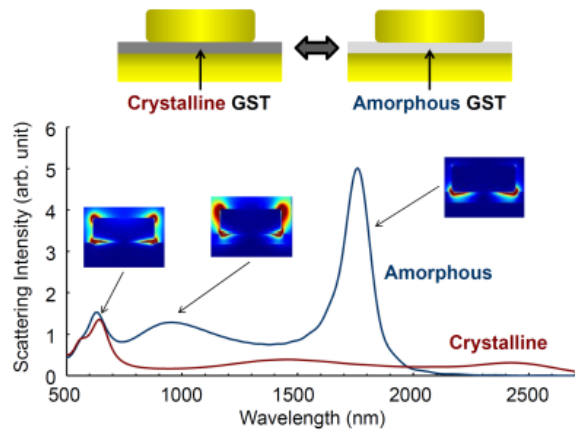


Fig.2

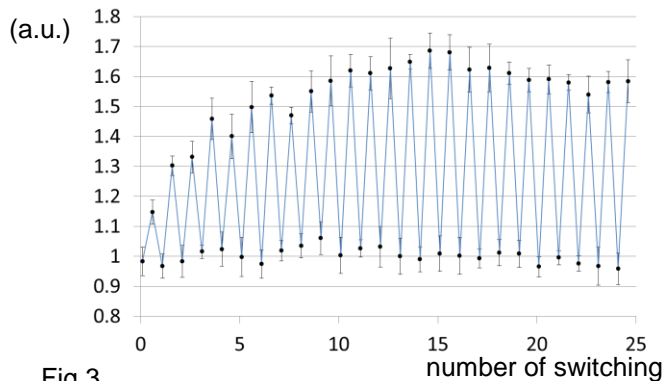


Fig.3