Zhong-Mei Huang et al., J Laser Opt Photonics 2018, Volume 5
DOI: 10.4172/2469-410X-C4-032

Crystallizing nanostructures and emission on black silicon prepared by ns-laser

Zhong-Mei Huang[1, 2] and **Wei-Qi Huang**[1]
[1]Guizhou University, China
[2]Fudan University, China

It is interesting that various tip shapes are generated on the black silicon (BS) prepared by nanosecond pulsed (ns) laser on silicon. In the fabrication process, the tip space ratio (tip radius/space width) on surface can be controlled by changing the pulsed laser parameters such as pulses repeat rate. It is found that the reflective rate is near 5% and the refractive index is also higher in visible range on the BS. We make the comparison between the BS samples prepared by pulsed fs-laser or ns-laser for the visible emission and the infrared emission near 1550 nm. The annealing time effect and the impurities effect were discovered in the BS emission, which are originated from crystallizing process in annealing and the localized states due to the impurities on nanocrystals. The BS samples prepared by fs-laser or ns-laser evolve in a similar fashion: the electronic states system with the three-levels is built for emission, in which the electronic states of nanosilicon in the BS play a role of pumping level and the localized states from the impurities and the defects in the BS play a role of emission level.

Biography

Zhong-Mei Huang, Collaborator at Guizhou University is the worker of pulsed laser etching (PLE) and pulsed laser deposition (PLD) research laboratory and Institute of Nanophotonic Physics in Guizhou University, she has a long-established international record in PLE and PLD grown nanosilicon and nanosemiconductor quantum materials and development of their applications in optoelectronics. She has led PLE and PLD research activities at Guizhou University since 2011, with a focus on a variety of semiconductor materials and nanostructures including Si and Ge quantum dots (QDs), quantun wells (QWs) and nanowires (NWs) on Si. She prepared the nanosilicon doped with oxygen and realized its stimulated emission near 700nm at first [1, 2], discovered the curved surface effect in emission on impuritied nanosilicon and provided its physical model [3, 4], discovered the regular growth of Si nanocrystals under irradiation of coherent electron beam and impuritied condensed effect on Si nanocrystals [5, 6] and observed the opening spin levels effect in the localized states originating from the impuritied nanosilicon [7]. She has recently investigated the simulation model of quantum chemistry calculation on impurities atoms bonding on nanosilicon [8]. She has published many papers exclusively in PLE and PLD grown Si and Ge nanostructures and devices in peer-reviewed journals including *Scientific Report, Appl. Phys. Lett., Opt.Lett*., and 2 book chapters. She has a strong record of collaborating PLE and PLD-related research in the projects funded by NSFC.

zmhuang@gzu.edu.cn