Space-Selective Modification of Glass by Using Femtosecond Laser

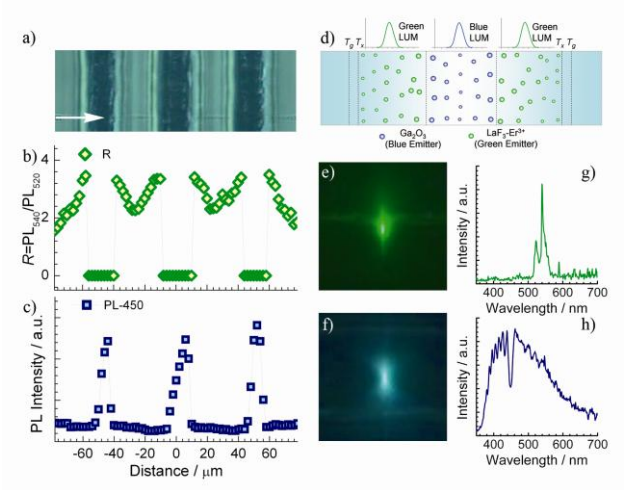
Shifeng Zhou[1*], Yongze Yu[1] and Jianrong Qiu[2]

[1] *State Key Laboratory of Luminescent Materials and Devices, South China University of Technology, Guangzhou 510640, China*

[2]*College of Optical Science and Engineering, Zhejiang University, Hangzhou 310027, China*

E-mail: zhoushifeng@scut.edu.cn

Laser induced modification and damage in transparent materials (e.g., glass) has attracted considerable interest and been studied since the advent of high power pulsed lasers. Especially while using a femtosecond laser as the irradiation source, the tight focusing and nonlinear nature of the absorption make it possible to confine the absorption to the focal volume inside the bulk of the material, allowing for micromaching in extremely small region. In this talk, we introduce the progress in space-selective modification of glass by using femtosecond laser. We show that some fundamental processes, including valence state change of dopant, decomposition of cluster, element redistribution, phase transition and nanocrystallization, can occur in the femtosecond laser irradiation region inside glass. As a result, the optical response of the modified glass can be controlled. For examples, the luminescence properties of main group ions doped glass can be tuned and tunable luminescence can be achieved. The microstructures with multicolor luminescence can be induced. The results suggest that space-selective modification of glass by using femtosecond laser can be applied to fabricate various types of 3D active microstructures.



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