Iranian Journal of Physics Research, Vol. 21, No. 4, 2022
DOI:

Random lasing emission from colloidal solutions of graphitic carbon nitride microstructures

P Rafieipour[1], A Ghasempour Ardakani[1], S F Nami-Ana[2], and J Tashkhourian[2]

1. Department of Physics, School of Science, Shiraz University, Shiraz 71946-84795, Iran
2. Department of Chemistry, College of Science, Shiraz University, Shiraz 71456, Iran

E-mail: aghasempour@shirazu.ac.ir

(Received 15 September 2020 ; in final form 27 May 2021)

Abstract

In this paper, we report on random lasing emission from colloidal solutions of graphitic carbon nitride (g-C_3N_4) microstructures. The g-C_3N_4 microstructures are dispersed in rhodamine B (RhB) dye solution to provide the necessary optical feedback via light multi-scattering events. RhB molecules provide optical gain via stimulated emission process under intense optical pumping. It is experimentally demonstrated that random lasing action occurs in the colloidal solution composed of dye and g-C_3N_4 microstructures, after a specific threshold. We study the pump dependent behavior of the proposed system. Since only amplified spontaneous emission is achieved from the solution of RhB dye without g-C_3N_4 microstructures, it is demonstrated that the existence of g-C_3N_4 microstructures has a key role in the observation of random lasing emission. Finally, we change the concentration of g-C_3N_4 microstructures and observe that the output intensity increases and the lasing threshold decreases by increasing the concentration of g-C_3N_4 microstructures. It is then verified that g-C_3N_4 microstructures can be a good candidate for the scattering medium in random lasers and the essential optical feedback for realizing random lasing emission is provided by light multi-scattering from g-C_3N_4 microstructures.

keywords: random laser, multiple light scattering, graphitic carbon nitride

For full article, refer to the Persian section