Emission regimes of random lasers with spatially localized feedback

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Abstract
We report the experimental results obtained with random lasers with spatially localized feedback [1], in which the active material, free of scatterers, is placed between two large scattering regions. Emission regimes with typical "resonant" and "non-resonant" random lasing spectra have been previously reported from large area devices [2]. Here, random lasing emission is investigated as a function of the illuminated area of the scattering regions, obtaining "resonant" and "non-resonant" spectral signatures, depending on the device geometry [3]. We propose a theoretical approach for the understanding of the observed phenomena, modelling the scattering elements with arbitrary spectral profiles in amplitude and phase and considering strong coupling between lasing modes. Good agreement between experiments and simulation results is obtained.

References
[1] A. Consoli and C.Lopez, Sci. Rep. 5, 16848 (2015).
[2] A. Consoli, D. M. da Silva, N. U. Wetter and C. López Opt. Express, 23, 23 (2015) 29954-29963
[3] A. Consoli and C.Lopez, Opt. Express, accepted (2016).

Figures

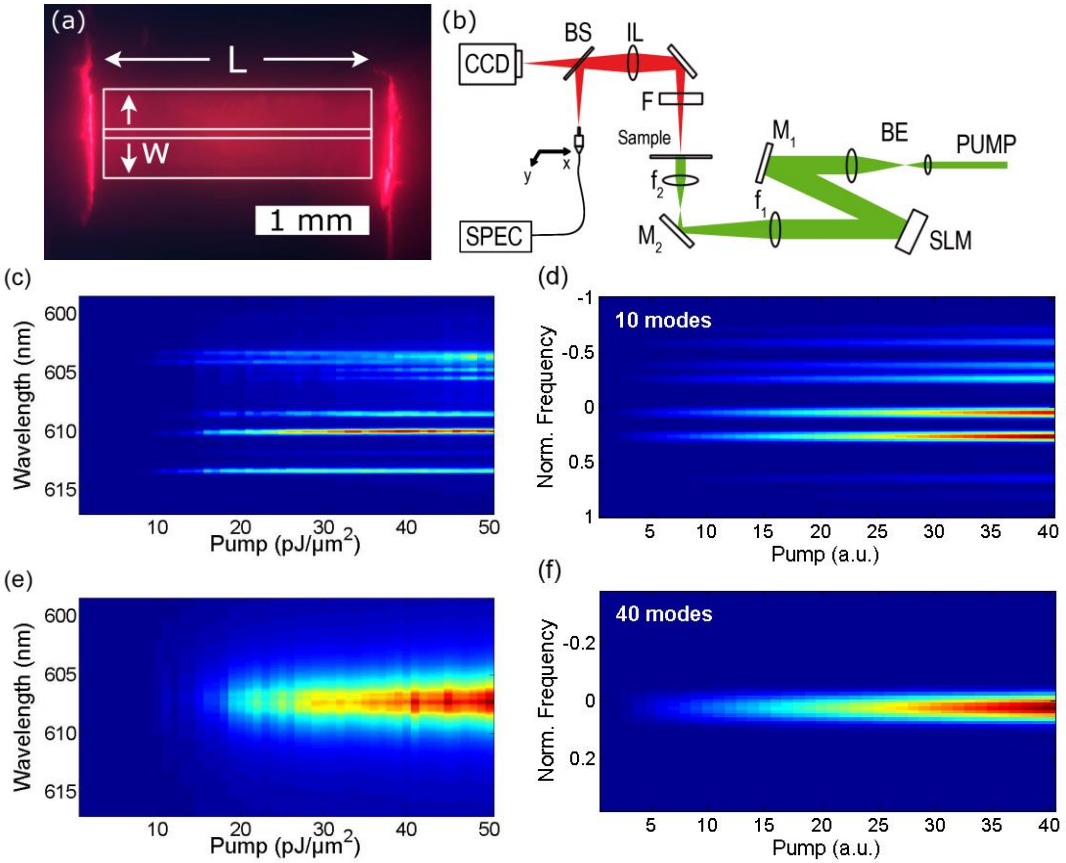

Fig. 1. (a) Sample image with device geometry: length (L) and variable width (W). (b) Experimental set-up. Emission spectra for increasing pump energy with few modes in experiments (c) and simulations (d). Emission spectra for increasing pump energy with many modes in experiments (e) and simulations (f).