Supplementary Information (SI) for Journal of Materials Chemistry C.

Supporting Information

Lasing from ordered colloidal micro-resonator arrays to random distributed systems

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The crude hollow silica (SiO_2) microspheres exhibit a log-normal distribution with two distinct maxima. This polydisperse composition was utilized directly in the random lasing (RL) experiments, where structural disorder is beneficial. In contrast, the photonic crystal (PC) configuration was prepared only after the scatterers were filtered to achieve the monodispersed morphology required for periodic self-assembly.

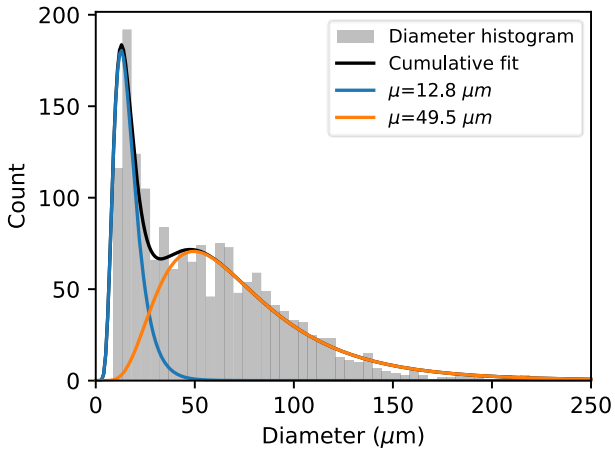

Figure S1. Particle diameter distribution of hollow silica microspheres. The data is fitted with a bimodal log-normal distribution, highlighting the two distinct population maxima within the crude sample.

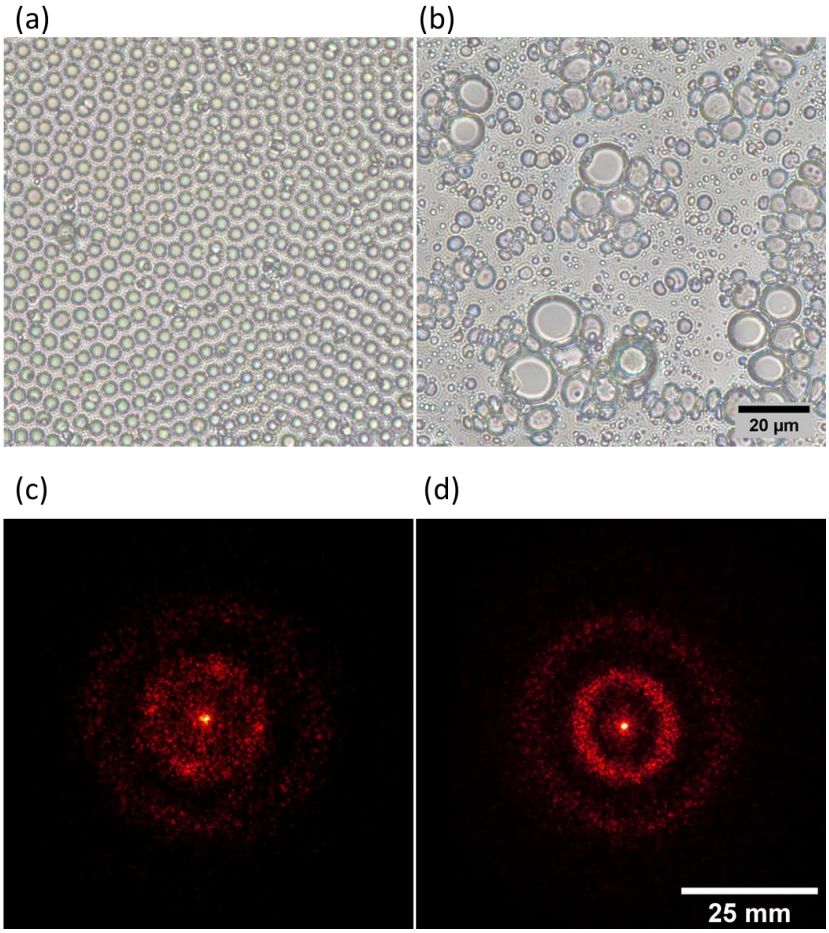

Figure S2. (a, b) Representative optical microscopy images of the sample following the filtering process. (c, d) HeNe laser diffraction patterns observed on a screen placed behind the sample at various locations, demonstrating the local periodic order of the microsphere assembly.

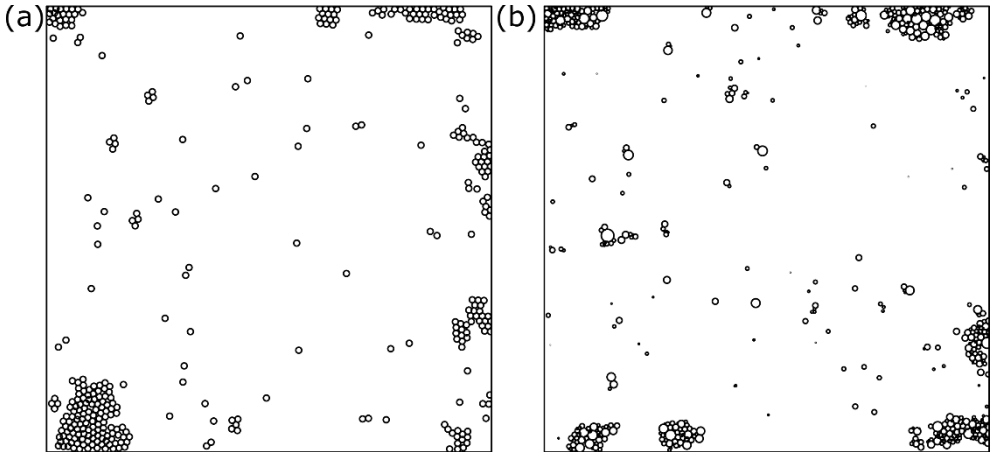

Figure S3. Representative images of structures covering 5% of area after rigid-body simulations with parameter σ=0.5, for (a) a monodisperse system and (b) a system with a random size distribution.

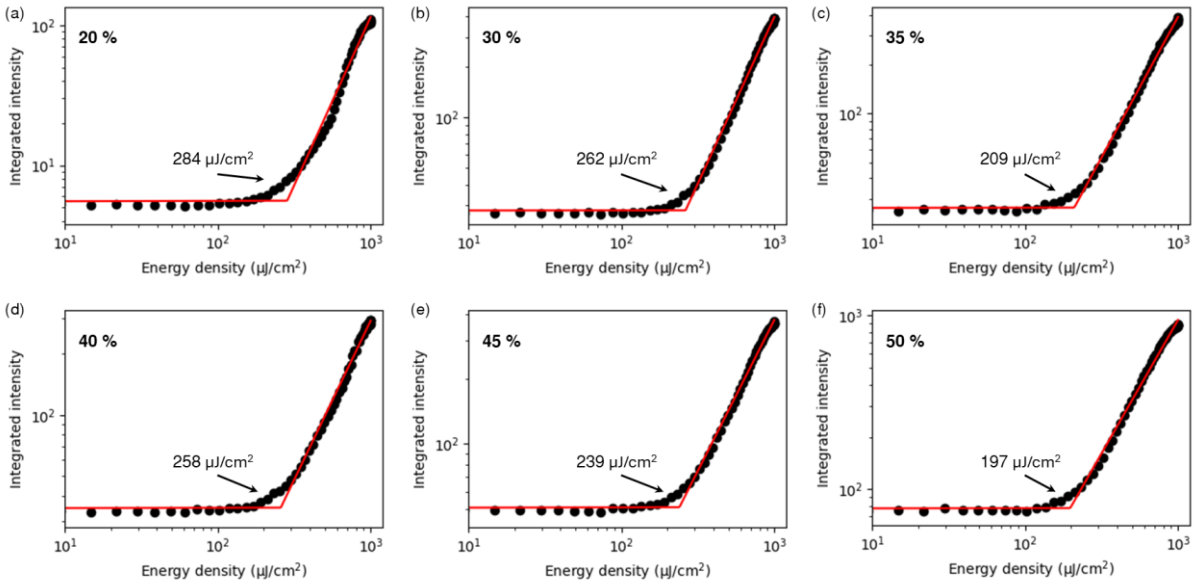

Figure S4. Integrated emission intensity versus excitation fluence, with lasing thresholds indicated, for different weight fractions of hollow microspheres embedded in a Rhodamine 6G-doped PMMA film: (a) 20 wt%, (b) 30 wt%, (c) 35 wt%, (d) 40 wt%, (e) 45 wt%, and (f) 50 wt%.