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Random Laser Emission from ZnO Nanocomposite Hybrids A. STASSINOPOULOS, S. H. ANASTASIADIS[1], D. G. PAPAZOGLOU, D. ANGLOS, Foundation for Research and Technology-Hellas, Greece, D. TSAGARAKIS, R. N. DAS, E. P. GIANNELIS, Cornell University — Highly scattering hybrid structures are produced either by incorporating ZnO nanoparticles in inert polymeric or inorganic sol-gel matrices or by depositing them on flexible substrates. All structures exhibit intense laser-like emission upon optical pumping. The ZnO particles provide both the gain and the strong scattering power, which lead to photon localization due to multiple scattering. The polymer matrix offers ease of material fabrication and processability while the elastic substrate offers flexibility in view of potential applications. Excitation of the hybrids by laser pulses shows threshold behavior demonstrated by a dramatic increase in the emitted light intensity and significant spectral and temporal narrowing. We study the influence of pump pulse duration and sample temperature on the random laser efficiency whereas we measure the coherence length of the emission. Nanocomposite fabrication issues and pumping conditions are varied aiming at performance optimization and, thus, potential use of such materials in future light emission devices. Sponsored by the Greek GSRT, by NATOs Scientific Affairs Division and by the EU.

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