

Abstract Submitted
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Transient Spectroscopy of Photoexcitations and Morphology Control of Organometal Trihalide Perovskites¹ YAXIN ZHAI, EVAN LAFALCE, Univ of Utah, CHUAN-XIANG SHENG, Nanjing University of Science and Technology, CHUANG ZHANG, DALI SUN, ZEEV VALY VARDENY, Univ of Utah — We studied the photoexcitation dynamics in various hybrid perovskites by using broadband ps transient photomodulation (PM) spectroscopy and variable stripe length (VSL) technique. We observed both excitonic and free carriers spectral features in MAPbI₃ but mainly excitonic transition in MAPbI_{1.1}Br_{1.9} and MAPbI_{3-x}Cl_x films. We also fabricated MAPbBr₃ films with nano-crystal pinning (NCP) treatment, which allows for smaller crystalline grain size. The transient spectra show a narrower and longer-lived photobleaching band in NCP treated films consistent with the increase in the photoluminescence efficiency. In addition the net optical gain measured by VSL is markedly increased up to 300 cm⁻¹, and the lasing threshold is concurrently reduced. Measurement of the waveguide losses in the NCP films shows that the improvement in lasing properties can partly be attributed to the reduced optical scattering.

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