

Pressure-induced luminescence study of MAPbBr₃: Mn perovskites

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The excellent light-absorbing properties of hybrid organic-inorganic perovskites have been the subject of fundamental investigation in various research fields. Amongst these materials, MAPbBr₃ perovskite materials are significantly more stable. Doping Mn²⁺ into hybrid halide perovskites has attracted much attention since it makes it easier for energy to move from the host material to the dopants, producing interesting photophysical properties. This work explores the behavior of Mn-doped methylammonium lead bromide (MAPbBr₃) under stress using photoluminescence. Temperature-dependent luminescence study of MAPbBr₃: Mn exhibited main peaks ~ 389 nm, 402 nm associated with low intense peaks with high energy. Effects of hydrostatic pressure on photoluminescence characteristics were investigated by diamond anvil cells to achieve pressure as high as 10 GPa, providing insight into any possible phase transitions, and the pressure coefficient was found to be -0.012 ± 0.001 eV/GPa. Origin of the various luminescence peaks and detailed analysis of the observed pressure dependence will be presented.

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