

Abstract Submitted
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Enhanced hot-carrier luminescence in multilayer reduced graphene oxide nanospheres¹ QI CHEN, CHUNFENG ZHANG, MIN XIAO, Nanjing Univ — We report a method to promote photoluminescence emission in graphene materials by enhancing carrier scattering instead of directly modifying band structure in multilayer reduced graphene oxide (rGO) nanospheres. We intentionally curl graphene layers to form nanospheres by reducing graphene oxide with spherical polymer templates to manipulate the carrier scattering. These nanospheres produce hot-carrier luminescence with more than ten-fold improvement of emission efficiency as compared to planar nanosheets. With increasing excitation power, hot-carrier luminescence from nanospheres exhibits abnormal spectral redshift with dynamic feature associated to the strengthened electron-phonon coupling. These experimental results can be well understood by considering the screened Coulomb interactions. With increasing carrier density, the reduced screening effect promotes carrier scattering which enhances hot-carrier emission from such multilayer rGO nanospheres. This carrier-scattering scenario is further confirmed by pump-probe measurements.

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