ABSTRACT

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Thesis Title: Ultrafast Exciton Dynamics of Lead Halide Perovskite Nanocrystals for Light Harvesting

Submitted by: **Mr. Goutam Ghosh**

This thesis entitled "***Ultrafast Exciton Dynamics of Lead Halide Perovskite Nanocrystals for Light Harvesting***" discusses the synthesis and ultrafast carrier dynamics of lead halide perovskite nanocrystals (NCs) for improving artificial light-harvesting. The basic understanding of (a) excited state carrier dynamics of lead halide perovskite (LHP) NCs with changing morphology; (b) hot hole transfer dynamics with porphyrin molecules; (c) slow hot carrier (HC) cooling dynamics; and (d) halide composition-dependent tunable electron transfer process with 2D CdSe nanoplatelets (NPLs) have been emphasized. This thesis provides a detailed understanding of the carrier relaxation dynamics of lead-based halide perovskite nanomaterials for optoelectronics, photovoltaics, and other light-harvesting applications.

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