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Name of Scholar: **Mohammad Salman Khan**

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Topic of Research: **Studies on Perovskite Materials for Photovoltaic Applications**

This research highlights the potential of lead-free double perovskite nanocrystal ($\text{Cs}_2\text{AgBiBr}_6$) for solar applications. Through a direct ultrasonic synthesis method to synthesized perovskite nanocrystals, with a size of range about 15 nanometers possessing dual applications.

The pristine nanocrystals exhibited environmental cleanup efficiency as they degraded 93% of dye pollutants within a span of 70 minutes under visible light while being stable for more than a month.

Due to their optimum light-absorption characteristics and appropriate energy bandgap, these materials are suitable for solar energy conversion.

The uniqueness of study is in doping approaches. The addition of iodine reduced the bandgap and increased the charge carrier lifetimes. New combinations of erbium-iodine and manganese-iodine were further tried for systematic tuning of the bandgap from 1.92 eV to 1.62 eV with remarkable solar absorption. All the samples were also stable and maintained their structure . These crystals show uniformity and have particle size 10-25 nm. The dopants are homogeneously distributed in the crystal without any damage. This work provides a feasible route to the sustainable photovoltaic technologies through the introduction of lead-free materials for advanced solar cells and remediation applications.