**PEROVSKITE BASED SOLAR CELLS**

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**1.Abstract**

The new class of hybrid materials (organic-inorganic combination) with versatile perovskite structures can be expected to alleviate our energy demands with restricted pollution and less cost**.** The history of growth is short within a decade is enormous, the efficiency of these materials reached the level of silicon single crystal devices. The replacement of the unhealthy poison component (like lead) has also been made in these versatile structures.

1. **Introduction**

Energy sources have been the main focused search for mankind for many centuries now. Solar cells is a simple solid-state device wherein the light energy is converted to electrical energy in usable form. These devices are also known as photovoltaic cells (PV) and have been mainly based on silicon( (nearly 95%) till recently. The basic principle of operation is light energy is used to excite an electron from the valence band of a semiconductor to conduction band and these charge flow in the external circuit produces electricity. The material of choice like silicon can be single crystals or polycrystalline or thin film form in all these three forms the efficiency varies but it works in all these forms. However, the cost and methodology of producing these materials have led to the search for alternate materials for solar cells.

Perovskites Usually of the composition (ABO3 and variations of this composition) [1] have been identified as one of the alternate material for substituting silicon single crystal devices. Even though, perovskite are known since 1839 (probably named after the Russian  mineralogist Lev Aleksevich von Perovski)   and subsequently in superconductivity was also recognized in these perovskite materials, the synthesis of hybrid (organic and inorganic) lead halide perovskite materials in 1978 alone led to the exploration of these materials in solar cells.  Soon, the properties of this new material at that time was recognized like optical and electronic properties with high absorption coefficient and high relative permittivity.

However, the use of an organic lead-halide perovskite as the central component of a solar cell would not happen until 2009 with an experiment meant to attempt to replace low voltage ruthenium-based inks in dye-sensitized solar cells with higher voltage Perovskite.

The growth of the science of organic inorganic perovskite is interesting more so its application to solar cells. Within a decade,[2] the efficiency of perovskite based solar cells reached a figure of 25.7% (26.7%[3]) from 3.8%. The most widely studied perovskite material for solar cell application is the hybrid organic–inorganic methylammonium lead halide CH3NH3Pb(I; Cl; Br)3. The advantages of these hybrid  metal halide perovskites are tunable bandgap, large absorption coefficient, long diffusion length, simple processability, small exciton binding energy, compatible with large-scale solution processing such as roll-to-roll printing, and abundance of ingredients.

**Configuration of Perovskite Solar Cells**

**The eeficiency of perovskite solar cells increased rapidly during their first six years of development, swiftly reaching 20% and recently surpassing the 25% mark.5**

**3. References**

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[4]