RESEARCH ARTICLE OPEN ACCESS

Boosting Solar Efficiency

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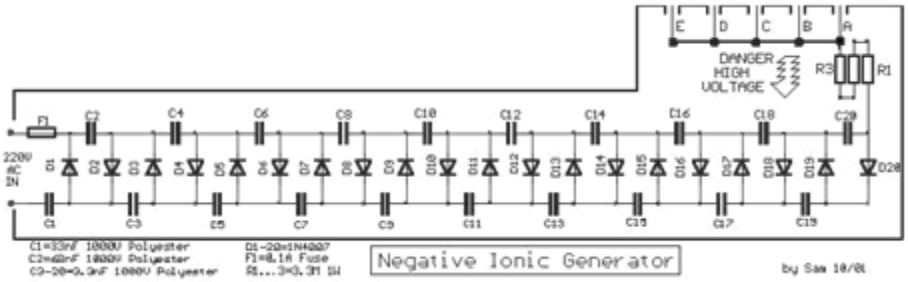
ABSTRACT:
Solar energy being most common form of renewable energy fails to hold its use in daily life because of its low efficiency and high maintenance costs. However, these short comings can be fought by using the electrostatic mechanism. In this, we charge the dust particles such that they are repelled by the solar panel itself and then removed. This mechanism is relatively cheaper and the power consumption of the same sums to almost zero. Also, efficiency can further be increased by using perovskites that forms an opaque layer over the solar panel. When both of these methods are used as a single hand, the efficiency increases drastically and can be easily employed in mega industries using mega solar panels.
KEYWORDS: High efficiency, low maintenance cost, electrostatic force, dust particles, perovskites, solar panels

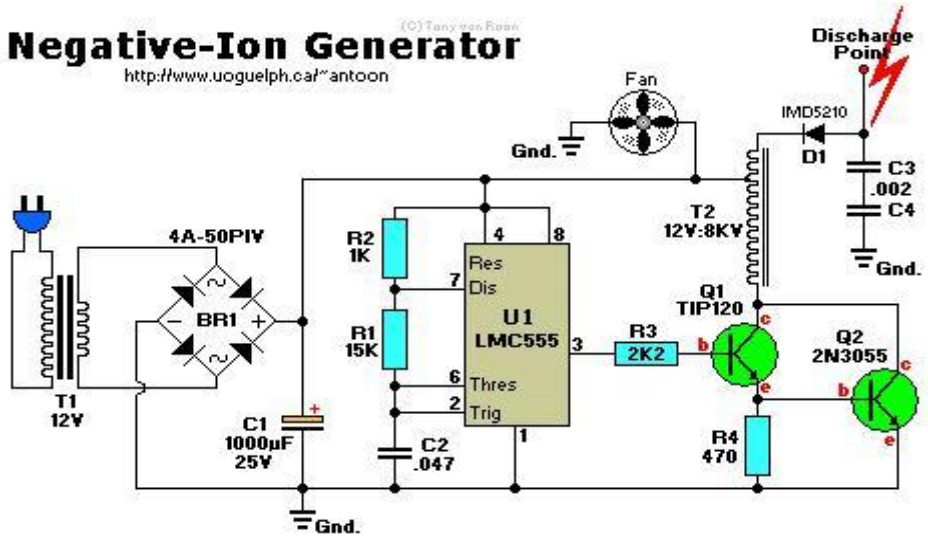
I. INTRODUCTION

In this advancing era, where the demands and need along with greed are just growing, therefore the need of power has also grown. Since the non-renewable sources have a limited life, therefore their scope for power is limited, and this is where the renewable sources of energy find their use. One of the most common and abundant source of renewable energy is solar energy. Solar energy, even though available in abundance fails to find its use in daily routine because of its low efficiency and high maintenance cost. Anyhow these short comings too can be fought by the mechanism suggested in following paper.

Solar energy is the most common renewable form of energy, yet fails to hold its use in daily life because of its low efficiency and high maintenance. The reasons behind low efficiency may include low intensity of sun rays, cloud formation, inefficient panels, storms, and the major reason could be the dust that settles down on the panel. This dust needs to be removed for efficient working, thus increasing maintenance costs, and if the panel is anyhow in deserted land then the use of water for cleaning the panel can be another add on because of scarcity of water in those areas. Therefore a better and easier method for dust removal can be self-removal of the particles by the panel itself by installing a dust removal mechanism. This mechanism involves electro charging the dust particles such that the dust particles are repelled from the solar panel by slightly inclining the plane such that 92% of adhering sand is repelled from the panel. This is achieved by using a corona discharge. A negative ion generator may look something like this

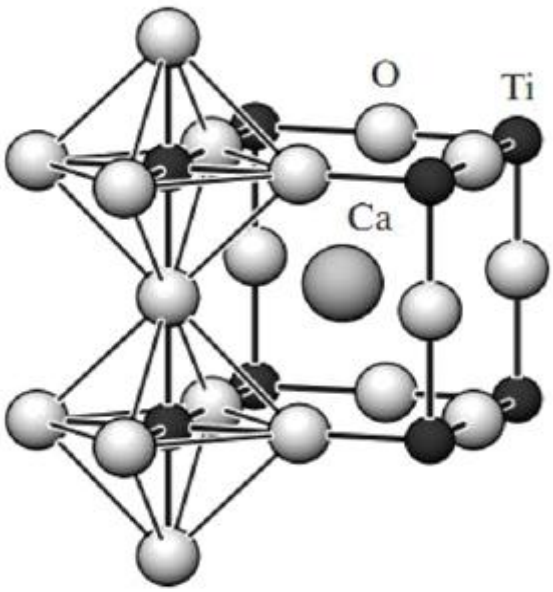


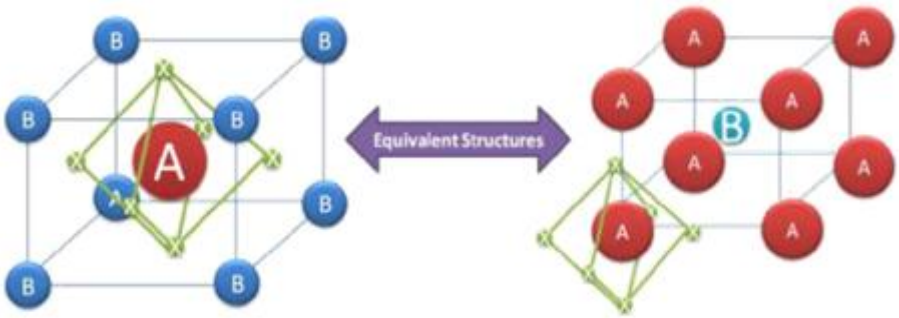
being configured as



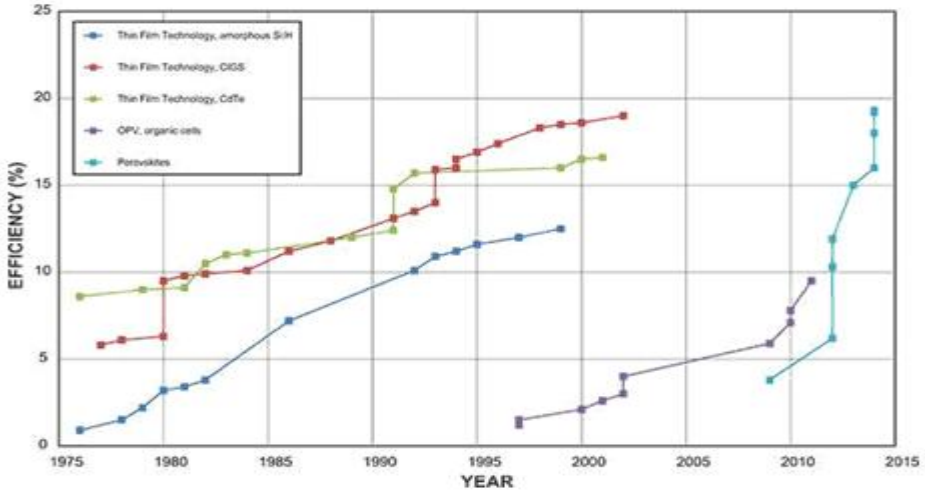
As the dust particles are electrically charged, the static charge lifts the particles up to 5-6cms and then slightly inclining the panel helps moving the particles to the other side of panel and thus helping getting rid of dust.

Yet another method can be introducing perovskites. One of the main challenges of pairing perovskite cells with silicon ones had replaced the former transparent, so that light they don't absorb can pass through to the silicon cells beneath. The perovskite solar cells made previously used an opaque material on the back to collect electrical current. Since Lead is hazardous and isn't environment friendly therefore tungsten shot or ammunition comes into play with the drawback of reducing efficiency by 2% as compared t0 efficiency provided by lead. Perovskites used have sub-metallic to metallic luster, colorless streak, cube like structure along with imperfect cleavage and brittle tenacity and general formula of ABO3. Crystals of perovskite appear as cubes, but are pseudocubic and crystallize in the orthorhombic system.

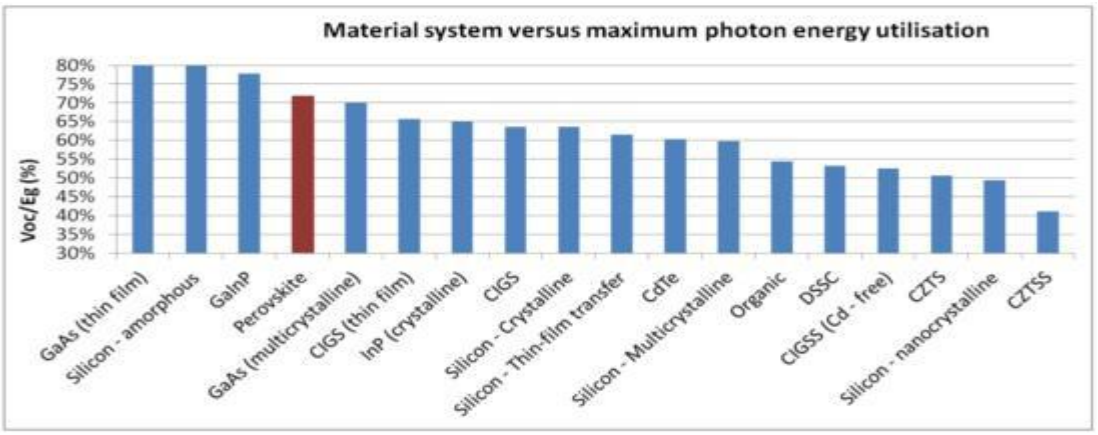




After the advent of perovskite, the efficiency of solar panels have increased with a boom. This is shown by a graph below



This graph demonstrates how much of a photon's energy is lost in the conversion process from light to electricity.



Perovskite based solar cells are fast approaching the same level of photon energy utilization as the current leading monolithic crystalline technologies such as silicon and GaAs. Furthermore, they also have the potential for much lower processing costs.

REFERENCES

[1] Journal of electrostatics
[2] Book of Solar Engineering by John Duffie and William Beckman
[3] Book of The Physics Of Solar Cells by Jenny Nelson
[4] Book of The Solar House by Daniel Chiras