

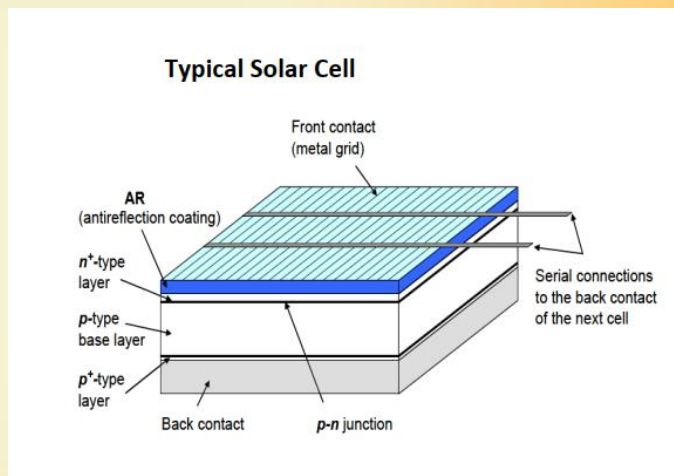
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Simulation of solar cells based on artificial materials

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Abstract: Metamaterials or negative index materials are novel artificial materials with negative electric permittivity and negative magnetic permeability which tend to absorb and focus a large amount of the incident light.

Solar cell technology or Photovoltaics are very useful technologies for generating the electrical power from the sunlight due to the increasing need of energy. The absorption, reflections, and transmissions are very important parameters which influence photovoltaic solar cell efficiency. The waveguides containing different materials can be modeled to be solar cells, such as thin films of silicon oxide and silicon nitride as anti-reflection coatings to minimize the reflection losses, or microcrystalline materials and organic semiconductors.

In this work, various multilayers waveguide structure containing metamaterials are proposed to enhance the absorption of solar light. In addition, the comparisons between the two types of structures are analyzed and discussed. The proposed waveguide structures are examined in terms of absorption and transmission of light for various physical properties of the structures. The proposed waveguide structures could be very excellent candidates for future solar energy technology.