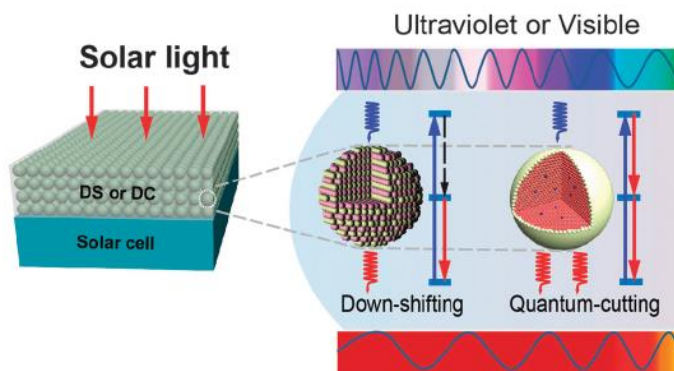


## Luminescent materials for photovoltaic application

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Recently, more attention has been paid to the solar cell as a mean to generate sufficient and clean energy. The major problem that limits the solar cells conversion is their insensitivity to the whole solar spectrum. This is the so-called spectrum mismatch. One approach to overcome the spectral mismatch problem is to use down and up-conversion layer based on luminescent materials. The down-converting layer placed on the front side of a silicon solar cell has the potential to generate more than one low-energy photons for every incident high-energy photon. Such DC mechanisms have been applied in similar luminescent materials used by the lighting and display industries. Recent theory has predicted that DC in conjunction with a Si solar cell can achieve energy efficiency of up to 38.6%. The main interest is in the development of rare-earth-doped inorganic materials based on down and up-conversion for solar cell application.



**Figure 1: Spectral conversion design for PV applications involving down-shifting (DS) and quantum-cutting (QC) luminescent materials.**