PhD Thesis Defense QUAN LIU 'Double Resonant Character in an Optical Cavity for High Performance and Stable Polymer Solar Cells'

QUAN LIU

March 23, 2018

Friday March 23, 11:00. ICFO Auditorium

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Organic Nanostructured Photovoltaics

ICFO-The Institute of Photonic Sciences

Solution-processed thin film solar cells emerged as very promising photovoltaic technologies suitable for a low cost roll-to-roll upscale production. Such thin film character also ensures lightweight and flexibility for the solar cell modules, making them ideal for a wide variety of

applications where silicon panels cannot be used. In addition to the above-mentioned advantages, common in all solution-processed thin film technologies, polymer solar cells (PSCs) have a unique semitransparency, which makes them very useful for solar window applications and very competitive in building integrated photovoltaics.

In recent years, a remarkable progress has been achieved in the field of PSCs. The power conversion efficiency of PSCs has already surpassed the 11% barrier. However, to be able to eventually compete with other solution-processed thin film technologies, such device efficiency must be further improved. Given the low charge carrier mobility in commonly used organic p-conjugated semiconductors, the tradeoff between optical absorption and charge collection, limits the thickness of the majority of photoactive layers currently being used to approximately 100 nm. To overcome the limited light absorption in such thin active layers, an adequate optical management becomes very important. Ideally, a light absorption or short-circuit current enhancement should be achieved without affecting the other photovoltaic parameters, such as the photovoltaic device open circuit voltage and fill factor.

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