SBIR 06.2 PHASE I - AWARD DETAILS	
ORGANIZATION	ARDEC
TOPIC NUMBER	A06-057
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YEAR OF AWARD	
AWARD START DATE	
AWARD COMPLETION DATE	
PROPOSAL NUMBER	A062-057-3253
TITLE	NIR Quantum Dot-Dye Complexes Exhibiting Multiple Exciton Generation and Forster Energy Transfer for High Efficiency Photo Voltaics
PROJECT MANAGER	Jennifer Gillies (518) 720-3061 jgillies@evidenttech.com
COMPANY	Evident Technologies, Inc. 216 River Street Suite 200 Troy NY 12180-3848 Minority Owned: No Veteran Owned: No Number of Employees: 40
KEYWORDS	quantum dots, dyes, forster energy transfer, FRET, multiple exciton generation, solar cell, photovoltaic
ABSTRACT	The Evident Technologies/Konarka Technologies team aims to develop quantum dot/dye complexes comprising near infrared bandgap PbS and CIGS quantum dots enveloped in novel dyes. The dyes will be designed to accept energy derived from photoexcited excitons within the quantum dots via a Forster energy transfer process. Do date, quantum dot based solar cells rely on inefficient tunneling processes that transport photoexcited charge carriers out of the quantum dot and into the surrounding polymer or electrolyte. Using the efficient Forster energy transfer phenomenon, individual charge carrier never leave the quantum dot, rather excitons recombine within the quantum dot and result in the creation of exciton within the dye molecules bound to the quantum dot surface. Additionally, "blue" and ultraviolet portions of the solar spectrum are more than twice the bandgap of the near infrared quantum dots. Recent experiments have demonstrated multiple exciton generation via an inverse Auger process that is exhibited when quantum dots absorb light having twice the energy as their bandgap. By harnessing this process, in addition to the novel forster energy transfer process, energy loss associated with charge carrier thermalization that occurs in conventional single junction solar cells can be averted.
BENEFITS	It is anticipated that the quantum dot/dye complexes developed in this project will be incorporated into thin film polymer solar cells and greatly increase their respective solar electric energy conversion efficiencies. The complexes will be able to absorb the majority of the solar spectrum, reduce energy losses associated with charge carrier thermalization by harnessing the multiple exciton

	genration phenemenon, and efficiently transfer charge out of the quantum dot to an enveloping dye layer a via a forster energy transfer process. In such a way, the complexes used in a polymer PV device circumvent the major energy loss mechanisms tht plague conventional single junction solar cells and also overcome the charge transport issues that have been observed with research level quantum dot based solar cells.