



## **Project 10: Project Progress Summary– Fall 2009 to Fall 2015**

Silicon solar cells today cost less than US\$0.50 per watt peak in contrast to almost US\$80 per watt peak in the 1970s. Further, solar photovoltaics electricity is at or approaching grid parity in many regions of the world today and photovoltaics has now become a commodity industry. The next step in the evolution of the solar photovoltaic industry is to reduce solar electricity cost even further – that is, striving toward levelized cost of electricity at or below that produced by fossil fuel based generators. Within this framework, further reduction of the cost of silicon through improved material utilization can contribute to this goal. The vision here is to advance silicon solar cell technology through continual thinning of silicon where ultra-thin silicon at few micron level or lower can yield over 20% conversion efficiency which is attained today with silicon thicknesses 50 -100 times greater. The present project is advancing this vision through the development of a range of technologies which include: novel low-temperature high-quality native oxide-based passivation of silicon; advanced amorphous-crystalline silicon heterojunction photovoltaics; ultra-thin silicon photovoltaic constructs; photonic crystal light trapping structures; photonic crystal patterned silicon photovoltaics.