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**Solar Photovoltaics Technology: The Revolution Begins . . .**

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The prospects of current and coming solar-photovoltaic (PV) technologies are envisioned, arguing this solar-electricity source is at a tipping point in the complex worldwide energy outlook. The emphasis of this presentation is on R&D advances (cell, materials, and module options), with indications of the limitations and strengths of crystalline (Si and GaAs) and thin-film (a-Si:H, Si, Cu(In,Ga)(Se,S)<sub>2</sub>, CdTe). The contributions and technological pathways for now and near-term technologies (silicon, III-Vs, and thin films) and status and forecasts for next-generation PV (organics, nanotechnologies, non-conventional junction approaches) are evaluated. Recent advances in concentrators with efficiencies headed toward 50%, new directions for thin films (20% and beyond), and materials/device technology issues are discussed in terms of technology progress. Insights into technical and other investments needed to tip photovoltaics to its next level of contribution as a significant clean-energy partner in the world energy portfolio. The need for R&D accelerating the now and imminent (evolutionary) technologies balanced with work in mid-term (disruptive) approaches is highlighted. Moreover, technology progress and ownership for next generation solar PV mandates a balanced investment in research on longer-term (the revolution needs revolutionary approaches to sustain itself) technologies (quantum dots, multi-multijunctions, intermediate-band concepts, nanotubes, bio-inspired, thermophotonics, solar hydrogen. . . ) having high-risk, but extremely high performance and cost returns for our next generations of energy consumers. Issues relating to manufacturing are explored-especially with the requirements for the next-generation technologies. This presentation provides insights into how this technology has developed-and where the R&D investments should be made and we can expect to be by this mid-21st century.