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Review of Photovoltaic Energy Production Using Thin Film Modules

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It is now widely accepted that thin-film photovoltaic (PV) devices will be important contributors of new US electricity generation. The annual production of PV devices needed to meet conservative U.S. Department of Energy goals for 2050 represents ∼100 square miles of active module area (20 GW), or ∼200 times the total area of photovoltaic modules installed in the US by 2004. However, if the rate of growth observed in PV module production for the past eight years continues, 100 square miles of annual US PV production could be achieved as early as 2018. Further, the amount PV installed by 2036 could generate the entire 2004 US Total Energy Consumption (∼100 Quadrillion BTU's, i.e., the combined energy consumed in the US from petroleum, coal, natural gas, nuclear, and all renewable sources). Regardless of what assumptions are made, PV represents a significant future market for related materials and technologies. This talk will discuss thin-film PV devices within the context of the major PV technologies in production today, and indicate areas where improved material and device understanding would be beneficial. This work was performed with the support of US Department of Energy Contract No. DE-AC36-08-GO28308.