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Next-Generation Photovoltaic and Thermoelectric Markets - 2011

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Abstracts

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It has been suggested that today's dominant PV materials, crystalline silicon and cadmium telluride, are more likely to be replaced by entirely novel high-performance PV and thermoelectric technologies and materials, than today's more well-known thin-film alternatives. Prior generations of PV were developed using traditional R&D methodologies, where experiments to optimize materials and structures were conducted in series over many years. Companies could reasonably expect it to take 10 to 20 years from first lab results through R&D to high-volume manufacturing. However, the next generation of PV is borrowing much speedier research methodologies from the pharmaceutical industry. In particular, it is using "combinatorial chemistry" systems that can perform dozens to hundreds of experiments in parallel, allowing a 10-fold acceleration in R&D and pilot line work. Consequently, new PV materials can now in principle be discovered, integrated, and fine-tuned for high-volume manufacturing within one to two years.

As a result of this approach NanoMarkets expects to see opportunities for materials and technologies such as "earth-abundant" kesterites (such as CZTS), nanorods, quantum dots, multi-exciton generation (MEG), metamaterials and plasmonics. Thermoelectric films are also an up and coming opportunity in this space and are being developed to convert waste-heat into additional electricity. And PV cells are being integrated into systems that generate hydrogen gas from sunlight and water. Most will fail to meet the cost and scalability challenge, but a few will succeed and will ultimately reach the 25-40 percent efficiency that today can only be reached with the most expensive and exotic materials.

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This new NanoMarkets report provides the first commercial assessment of the new PV and thermoelectric technologies that we believe will represent opportunities in the near future. In this report we analyze the progress that has been made technically in all the major areas of next-generation PV and related technologies and provide roadmaps to their future development. However, even more importantly, we also show where the first addressable markets for these technologies are likely to appear over the coming decade. In addition, we discuss how these newer technologies will compete with existing products. And, as with all NanoMarkets reports we include our eight-year revenue projections for the technologies covered and an analysis of the strategies of the companies currently seeking to develop them.

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