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Solar Glitter: Low Cost, Solar Energy Harvesting with Microsystems Enabled Photovoltaics

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The sun covers our environment with energy harvesting opportunities throughout the day. Although great progress has been made in developing low-cost, solar photovoltaic technologies to harvest the sun's energy, the traditional silicon-based PV module format has remained unchanged for almost 40 years, thereby limiting energy harvesting to rooftops and large open spaces. Thin-film and building-integrated photovoltaics have increased the opportunity for energy harvesting, but suffer from low-efficiency. We have developed, based on micro-electro-mechanical systems (MEMs) and other microsystems technology, a new approach to solar photovoltaics applicable in a wide range of environments – Microsystems Enabled Photovoltaics (MEPV). MEPV solar cells made from crystalline silicon or III-V compound semiconductors (for example, GaAs) are 5-20 microns thick and with lateral dimensions of 250 microns to 1 mm. These solar cells minimize the amount of expensive semiconductor used, but retain the high efficiency of crystalline materials, and allow novel module and system designs not possible with traditional approaches. This talk will outline the science and engineering of MEPV technology, and highlight several novel applications.