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by Jason Lomberg, Technical Editor

efficiency zone
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Regular Efficiency Zone [1] readers know [2] that photovoltaics is a very inefficient technology. While the technology is environmentally-friendly, and the energy source (the sun) will be viable for billions of years, the conversion process (and viability) is undercut by a number of factors. These include shade, dirt, and panel-to-panel mismatch. In addition, detractors of the technology point to its high cost, but this is a socio-economic factor that won't be solved by science alone. But scientists at the U.S. Department of Energy's National Renewable Energy Laboratory [3] (NREL) have made a huge technological leap [4]. They've set the world record for solar cell efficiency with a photovoltaic device that is 40.8 percent efficient.

The previous record holder used a germanium wafer as the

bottom junction of the device. This new advancement uses compositions of gallium indium phosphide and gallium indium arsenide to split the solar spectrum into three equal parts. The parts are then absorbed by the cell's three junctions. Because of the system's mismatched semiconductors, higher efficiency rates are possible. The 40.8 percent efficiency was achieving by harnessing the light of 326 suns. On your average sunny day, one sun equals the quantity of light that reaches Earth.

But don't expect to see this device attached to your home anytime soon. Those wanting a look should break out a telescope. According to NREL, "The new cell is a natural candidate for the space satellite market and for terrestrial concentrated photovoltaic arrays, which use lenses or mirrors to focus sunlight onto the solar cells." But many consumer electronics started as government programs, so perhaps this photovoltaic device will lead to home solar cell advances.

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