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Hybrid energy harvester
(ROI #2010-03)

Description

- A piezoelectric material (e.g., PZT)-carbon nanotube film based cantilever
- The cantilever bends repeatedly upon exposure to light and thermal radiation
- The cantilever can be made at both macroscale and microscale, depending on specific applications and can be arrayed to increase output
- Capable of scavenging or generating power from multiple types of energy such as solar, thermal and vibration sources

Advantages

- Hybrid energy harvesting, not limited to one source of energy. Can continue to operate in absence of light if thermal or vibration energy (wind) is available
- Scalable power output. Power output from several micro-Watts to tens of milli-Watts is feasible with arrayed micro-devices
- Piezoelectric. No voltage bias is needed and the generator works with no external power
- Light weight. The generator weighs only several grams
- Low cost and ecological. One single microscale device is in the range of a few cents but the cost can be reduced further through economies of scale
- Named to Ecofriend.org's Top 10 Renewable Energy Technology Breakthroughs in 2010 (<http://www.ecofriend.org/entry/10-breakthroughs-in-renewable-energy-technology-in-2010>)
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- Feel free to pass the news story along to your government friends.

Areas of Application

- Power charging for batteries
- Self-power sources for consumer electronics from some toys, cell phones, iPhones, desktop computers to laptop computers
- Self-power sources for whole host of devices such as wireless sensory network, biomedical devices, low-power VLSI, low-power micro or nanosensors or systems

Patent Status

- US 8,901,802

Publications

- Kotipalli et al, (2010), Light and thermal energy cell based on carbon nanotube films, *Applied Physics Letters*, **97**, 124102-1.