



Overview of distributed energy storage for demand charge reduction

Said Al-Hallaj, Greg Wilk, George Crabtree, Martin Eberhard

Utilities bill customers not only on energy use but peak power use since transmission costs are a function of power and not energy. Energy storage can deliver value to customers by leveling demand and reducing demand charges. The authors present a comprehensive overview of electrical and thermal energy storage technologies but focus on mid-size storage technologies for demand charge avoidance in commercial and industrial applications.

<https://doi.org/10.1557/mre.2017.18>

The electrification of energy: Long-term trends and opportunities

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The authors present and analyze three powerful long-term historical trends in the electrification of energy by free-fuel sources (predominance of electricity, generated from free-fuel sources, transported bidirectionally and traded at dynamic prices). These trends point toward a future in which energy is affordable, abundant, and efficiently deployed, with major economic, geo-political, and environmental benefits to humanity. <https://doi.org/10.1557/mre.2018.6>

Energy in buildings—Policy, materials and solutions

Matthias M. Koebel, Jannis Wernery, Wim J. Malfait

A bird's eye view of energy use in buildings is explored with discussion of how energy policy leads to building standards that affect innovation in the building sector. The authors review current and future materials and solutions for the building envelope (insulation and glazing), along with renewable energy generation and energy storage, and demonstrate how the integration of buildings into district networks mitigates problems arising from a building's and its users' dynamic behavior. <https://doi.org/10.1557/mre.2017.14>



Device processing and junction formation needs for ultra-high power Ga₂O₃ electronics

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Ga-based alloys and oxides are semiconductor materials of choice due to their controlled phase behavior, epitaxial deposition, and superior electrical and optical transport properties. Power electronics devices have specific requirements for thickness and doping control that takes advantage of these semiconductor properties for applications such as MOSFET, rectifiers, and wireless charging systems.

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3D printing of poly(vinylidene fluoride-trifluoroethylene): A poling-free technique to manufacture flexible and transparent piezoelectric generators

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3D printing or additive manufacturing is fast becoming the method of choice to fabricate devices from materials that are otherwise made from traditional formative or subtractive processes. PVDV and copolymers are well-known piezoelectric materials that can be fabricated via 3D printing toward more complex device architectures.

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Elastomer-based MEMS optical interferometric transducers for highly sensitive surface stress sensing for biomolecular detection

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MEMS devices based on elastomeric and nanosheet materials make use of thermo-mechanical properties to drive higher sensitivity and selectivity for sensors. The goal is to use a combination of stimuli-responsive properties of materials in small and miniaturized devices that can be fabricated with unconventional methods.

<https://doi.org/10.1557/mrc.2019.11>