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# Towards self-powered photo-electrochromic systems via cost effective integration of Metal-ZnS/ZnO Schottky junctions

There is a drive towards more energy efficient structures. Significant energy is used to cool structures, with an estimated 20-50% of heat absorption occurring from sunlight radiation through windows. Removing cooling loads from windows translates to a total estimated cost of almost $15 billion per year. A small fraction of these windows encompass energy-savings design features such as low-emissivity coating, argon filling, and vacuum insulation. Furthermore, windows have massive potential for power generation and integration of self-powered electronics, sensors, and displays while retaining nearly identical optical properties. Therefore, there is a need for a technology that can both reduce heat absorption and eliminate the need of an outside power source for integrated self-powered electronics, sensors, and displays.

Researchers at Arizona State University have invented a method of integrating visible-wavelength-transparent, UV-absorbing, and voltage generating PV devices comprised of Metal-ZnS/ZnO schottky junctions. Using ZnS/ZnO junctions lowers production cost and improves solar cell efficiency. These junctions are also flexible, creating the possibility of integrating PV cells onto contoured windows. Existing glass can be retrofit to incorporate PV devices, and this invention can be integrated into existing glass production processes at low cost.

Potential Applications

- Smart windows
- PV solar power
- Personal electronics
- Commercial and residential building energy efficiency
- Building lighting systems

Benefits and Advantages

- Low Cost –
  - Reduced energy demand for buildings.
  - Existing windows can be retrofit with PV cells.
- Scalability –Production methods can easily be scaled up to meet large-scale production needs.
- Environmentally Friendly – Reduced energy demands decrease the amount of greenhouse gas emissions.
- Optically Transparent – Light can still pass through the window to illuminate the space.

For more information about the inventor(s) and their research, please see

Dr. Hongbin Yu's directory webpage

Dr. Sandwip Dey's directory webpage