Spectrally Selective Coatings for Concentrated Solar Power Systems

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BACKGROUND

Concentrated solar power and solar hot water systems convert sunlight to thermal energy (heat) by using solar absorbers. For efficient operation, the solar absorber has to effectively absorb the solar energy without emitting much of its own blackbody radiation. As most materials do not possess such features naturally, a spectrally selective coating (SSC) is usually needed. Ideally SSCs would possess: (a) high absorption (0.95) in the solar spectrum (0.3-1.5 microns); (b) low emissivity in the IR spectrum (1.5-2 microns) corresponding to the blackbody radiation of the surface temperature of the solar receiver; and, (c) excellent durability at elevated temperatures, preferably in air and with humidity. Further, the coating performance should not degrade significantly during the lifetime of a solar thermal system, and the coating and its adhesion to the substrate must have excellent thermal cyclability due to the intermittent nature of solar irradiation.

TECHNOLOGY DESCRIPTION

University researchers have developed spectrally selective coatings (SSCs) with ultra-high optical performance and a highly scalable process to make them. The invention's SSCs exhibit the combined features of ultra-high solar absorptivity, low IR emissivity, low cost and high temperature durability. The SSC can be applied to the solar collector used in solar hot water panels, to the receiver of concentrated solar power systems for electricity generation and in tandem with a thermoelectric generator to capture heat from sunlight for conversion into electricity.

INTELLECTUAL PROPERTY INFO

The technology is available for sponsorship and/or licensing.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,371,416	08/06/2019	2012-233

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OTHER INFORMATION

KEYWORDS

Spectrally selective coating, Concentrated solar power, Solar thermal

CATEGORIZED AS

- **Energy**
  - Solar
- **Materials & Chemicals**
  - Nanomaterials

RELATED CASES

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