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## Material For Thermal Regulation

Tech ID: 30402 / UC Case 2017-802-0

### BRIEF DESCRIPTION

Researchers at UCI have developed a lightweight, flexible thermal material that, due to the extent that it is stretched, allows for tunable control of heat flow.

### SUGGESTED USES

For consumer (clothing) and industrial (pipe insulation) applications requiring dynamic control of heat flow through the material

### FEATURES/BENEFITS

- Passive: Once stretched to its desired position, thermal regulation via heating/cooling is achieved passively through simple reflection/transmission of IR waves
- Dynamic: As the amount of thermal radiation passing through the material depends on the extent of stretching, it allows for dynamic control of heat flow
- Robust: The material is made from highly robust and mechanically durable materials
- Inexpensive: Both the IR reflective metal and IR transparent elastomer can be made from readily available, inexpensive materials
- Lightweight and flexible: The thin metal film and underlying elastomer architecture gives the material a lightweight and flexible nature, unique among other thermal membranes

### TECHNOLOGY DESCRIPTION

The control of heat (IR radiation) transport has long been an area of active research and technological advances. Thermal regulation is achieved via passive materials, which allow heat flow in only one direction (car sunshades, fleece sweater), or active approaches, which allow for dynamic control of heat flow (HVAC). Active solutions are typically preferred for most consumer and industrial application, as they provide both heating and cooling effects. However, current state-of-the-art thermal membranes that allow for such dynamic control of heat flow are often complex, expensive, and energetically costly.

To combat these issues, researchers at UCI have developed an inexpensive thermal material that allows for passive and adjustable control of heat flow. Here, the amount of IR radiation that passes through the material is controlled by the extent it is stretched. In its native (un-stretched) form, the material reflects IR radiation back toward the source. Upon gentle stretching, it allows more IR radiation to pass through the film, and away from the source. Such a material has important applications in “smart” athletic and outdoor clothing, which can respond to changes in body or environmental temperature.

### PATENT STATUS

### CONTACT

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### INVENTORS

» Gorodetsky, Alon A.

### OTHER INFORMATION

### CATEGORIZED AS

- » **Materials & Chemicals**
  - » Nanomaterials
  - » Other
  - » Polymers
  - » Textiles
  - » Thin Films
- » **Nanotechnology**
  - » Materials
- » **Engineering**
  - » Other

## STATE OF DEVELOPMENT

Currently in the working prototype stage.

### ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ A sustainable and scalable bioinspired material with tunable heat-managing properties
- ▶ Cephalopod-Inspired Adaptive Infrared Camouflage Materials and Systems

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