Photonic Structure Textiles for Localized Thermal Management

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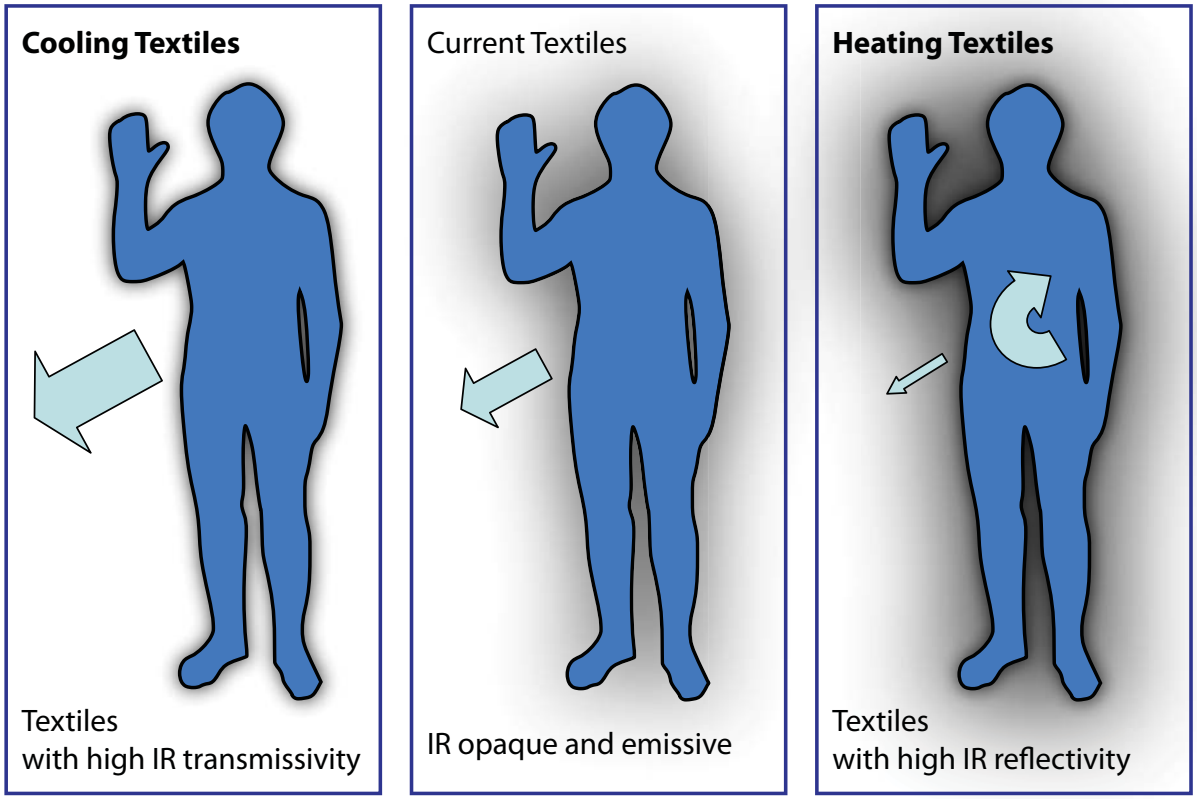
(Award duration: 3 years)

Radiative cooling and heating using photonic structure textiles

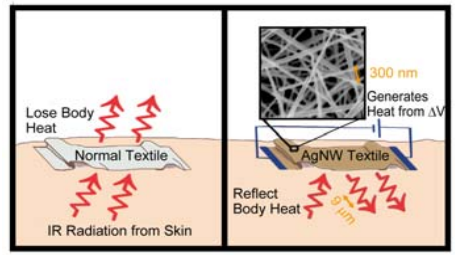


- *Approach: Colored photonic structure textiles for radiative cooling/heating through engineered infrared (IR) properties*

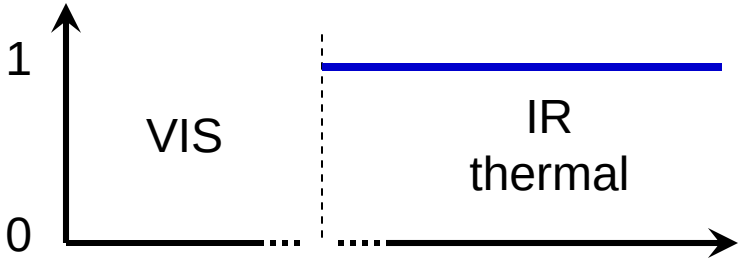
Photonic structure textiles: Spectral characteristics & System impact

- Cooling: IR transparent textiles to enhance heat dissipation (compared to current textiles)
- Heating: IR reflective textiles to reduce heat dissipation

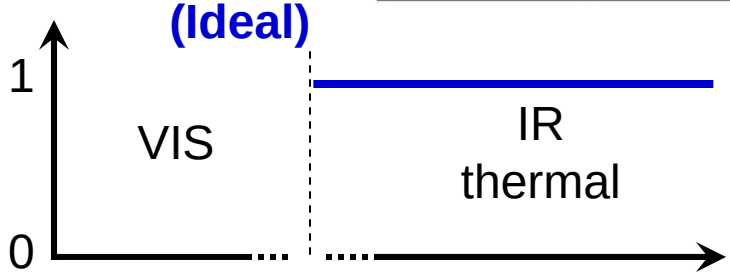
Hsu et al., Nano Lett. (2014)



Transmittance (Ideal)



Reflectance (Ideal)



- System impact: Reduce energy consumption for heating / cooling of buildings by 15% without sacrificing comfort

Validation plan & Performance target

- Identify materials. Perform therm. simulations
- Perform photonic structure design
- Fabricate photonic structures: small- and textile-scale
- Textile integration & system-level testing

- Demo: Photonic structure textiles with IR radiative cooling/heating beyond current textiles

How the DELTA community can help us

- We want to connect with textile experts and textile centers

- Learn more about basic characterization of existing textiles (hand, drape, softness, …)
- How can we integrate photonic structure textiles with existing textile manufacturing processes?