

META-COOLING TEXTILE

Performance Team



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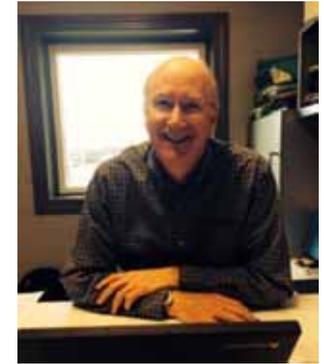
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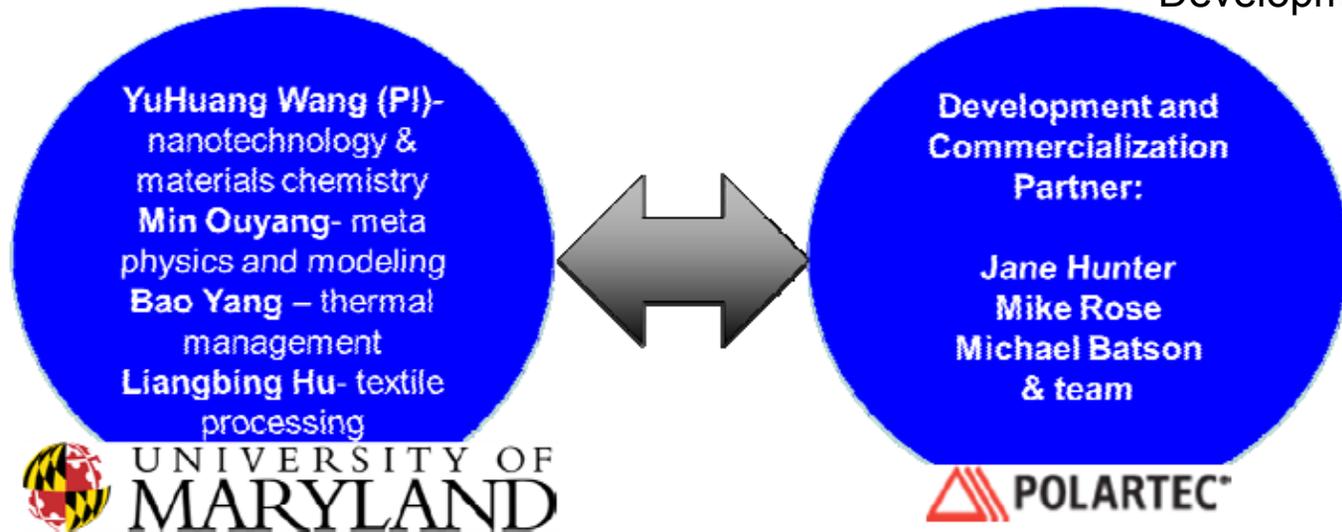
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Duration of Award: May 1, 2015-April 30, 2018

META COOLING TEXTILE WITH SYNERGETIC INFRARED RADIATION AND AIR CONVECTION FOR BIDIRECTIONAL THERMOREGULATION

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Technology Summary

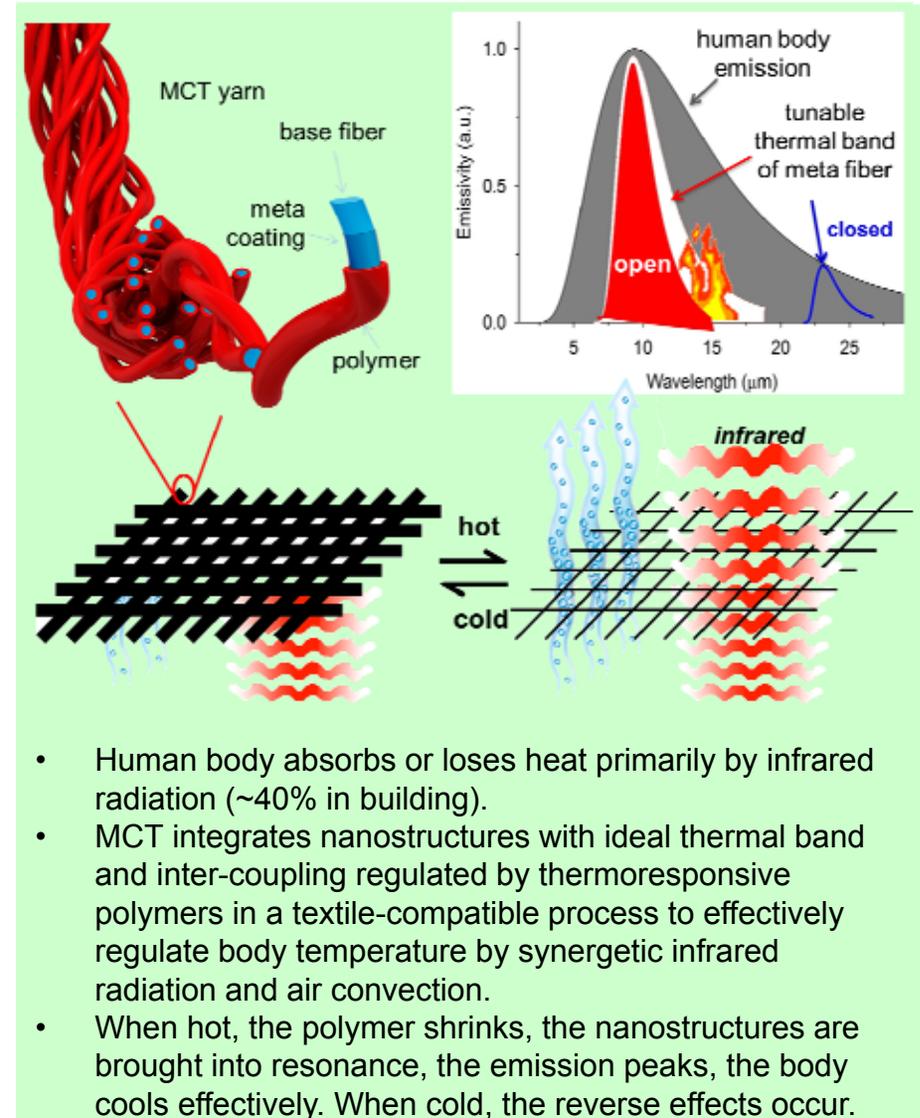
- Active infrared emissivity control in clothing, for the first time, through innovative meta-fiber technology.
- Self-power fast autonomous thermoregulation of clothing.
- Maximize the efficiency of localized cooling/warming through synergetic actions of all 4 major mechanisms.

Technology Impact

- Reduce energy cost of buildings by at least 15%, equivalent to 2% of all energy used in the United States.
- Impart a revolutionary new function into clothing, which may penetrate the >\$600B global industry of apparel manufacturing.

Proposed Targets

Metric	State of the Art (air conditioned clothes)	Proposed
Added Thermoregulation Capacity	N/A	41 W
Self-regulation	No	Yes
Power Consumption	2.5 -5 W	0
Weight Increase	> 10%	2.5%
Cost Increase per T-shirt	~ \$100	\$0.88 - 3.42



Efficient LTMS with bidirectional thermoregulation at a fraction of cost.

MCT vs. State-of-the-Art Wearable LTMS

- Cooling vests (including evaporative cooling)
- Sweat wicking (e.g. Nike Sphere React)
- Air-conditioned jackets
- Disadvantages (air-conditioned jackets specifically):
 - Bulky (require 2 fans, control box, cable, and 4 AA batteries every 5 hours)
 - Costly (\$140 or more per system)
 - One direction regulation



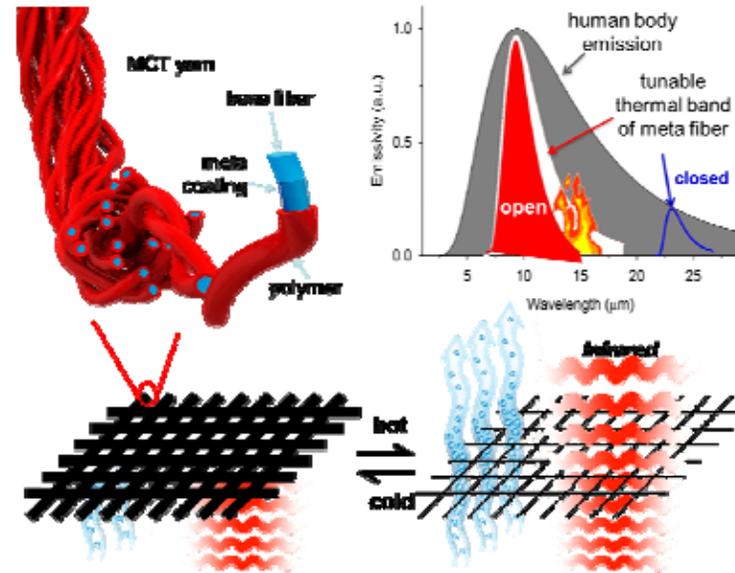
Nike Sphere React



Kuchofuku Air-Conditioned Cooling Coat

End-of-Project Deliverable

- Working prototype:
 - a Meta Cooling Textile of 4" x 4" with added bidirectional regulation capacity of ~ 41 W to meet the $\pm 4^\circ\text{F}$ setpoint expansion target.
- Key parameters of performance:
 - Responsive infrared radiation
 - Synergetic air convection



- Key project segments:
 - MCT design and modeling
 - MCT assembly
 - System-level optimization of MCT fabrics
 - Commercial viability of MCT technology

You Can Help!

- 1. Concrete suggestions on opportunities for MCT**
 - Interactions/partnerships with your company
 - Collaborations with your faculties or researchers
- 2. Assessment and critique**
 - Market/technology balance, credibility, impact
 - Skill set suitability for success in meeting the project goals
- 3. Experts to connect**
 - Nano/micro fabrication,
 - Infrared measurement,
 - Industrial partners for MCT product development, ...

Questions? Comments? Suggestions? Please contact

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