CABLE Conductor Manufacturing Prize

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Submission Title:	*Super Cool Conductor*

Description of Material

- *Super Cool Conductor* is a RE-Ba-Cu-O (REBCO, RE = rare earth) conductor that is 8x less expensive than the state-of-the-art superconductor.
- As a superconductor, *Super Cool Conductor* has infinite conductivity. But at ½ the price of copper wire in terms of $/kilo-ampere-meter, *Super Cool Conductor* breaks the affordability barrier.

Fabrication Approach

- *Super Cool Conductor* is made by an Advanced Metal Organic Chemical Vapor Deposition method where the REBCO is coated as a film up to 5 µm in thickness on a metal foil in a roll-to-roll continuous manufacturing process.
- Using direct heating and laminar flow methods, *Super Cool Conductor* is made with 4x performance as the state-of-the-art superconductor and at half the cost.

Potential Impact

- *Super Cool Conductor* will be used for light-weight motors, cables, and generators that can enable electric aviation for passenger aircraft and reduce 5 metric tons of CO_2 for each hour of flight.
- Enables compact fusion power plants that are affordable and emit no CO_2 (1.2 million metric tons avoided with each plant each year).
- Enables industrial motors with 2% higher absolute efficiency (450 metric tons of CO_2 avoided with each 5.5 MW motor each year).
- Enables low-loss power transmission cables that saves 5,100 metric tons of CO_2 per kilometer each year.
- Enables light-weight wind generators > 20 MW → makes wind power generation more economical with fewer turbines in a wind farm.