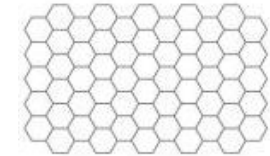


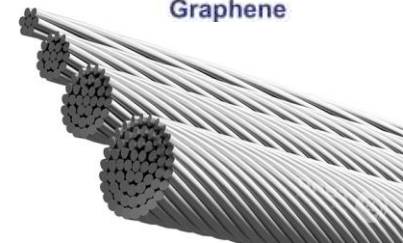
CABLE Conductor Manufacturing Prize



U.S. DEPARTMENT OF ENERGY



Graphene



Team Name:	<i>VT Materials</i>
Primary Submitter:	W. Doug Hartley
City and State:	Blacksburg, VA
Member Names:	W. Doug Hartley, Greg Hahn, Jake Yoder, Hang Z. Yu
Submission Title:	Enhanced Conductivity Overhead (ECO) Wire

Al-Graphene Wire Material

- Bulk aluminum-graphene composite material
- **Enhanced Properties** (expected)

1. Electrical Conductivity by Density: **14.9 kSm²/kg**, [69.5% IACS]
2. Thermal Conductivity: 245 W/m·K
3. Yield Strength: 250 MPa

Potential Applications:

Utility AC power transmission, HVDC power transmission

SPD Fabrication

- Novel solid-state severe plastic deformation (SPD) manufacturing technique for *continuous* production of graphene-reinforced Al wire
 - Low energy input
- Overcomes existing SPD manufacturing limitations
- Proof-of-concept material processing demonstration shows excellent mixing

Affordability & Impact

- Cheap and abundant *bulk* feedstock
 - Potential use of *recycled* legacy AA1350 wire
- No exotic components or materials enabling domestic sourcing & production
- Estimated cost of key wire materials and processing - **49\$/1000ft**
- Estimated energy savings[†] - 21TWh/yr
- Estimated CO2 reduction[†] - 8.7 Mt/yr