

Novel Low-cost Method for Graphene Production

VTIP 18-145: “A Novel One-pot Process for Synthesis of Graphene and Graphene Derivatives from Coals”

THE CHALLENGE

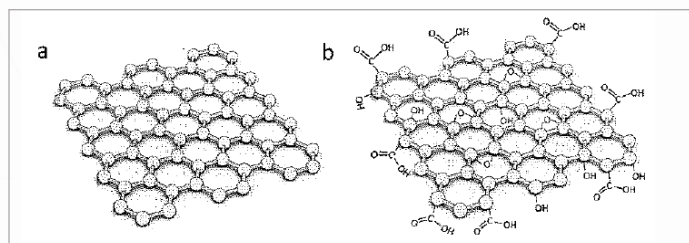
Graphene is a potential “miracle” material with superior properties of tensile strength, thermal and electrical conductivity, and corrosion resistance. The Hummers’ graphene production method is widely used but involves multiple oxidation agents, making the process very expensive. A gram of graphene made with this method can cost over \$150, which is a barrier to commercial exploitation of the material. Cheaper production methods are needed in order to make graphene a commercially viable material for many applications.

OUR SOLUTION

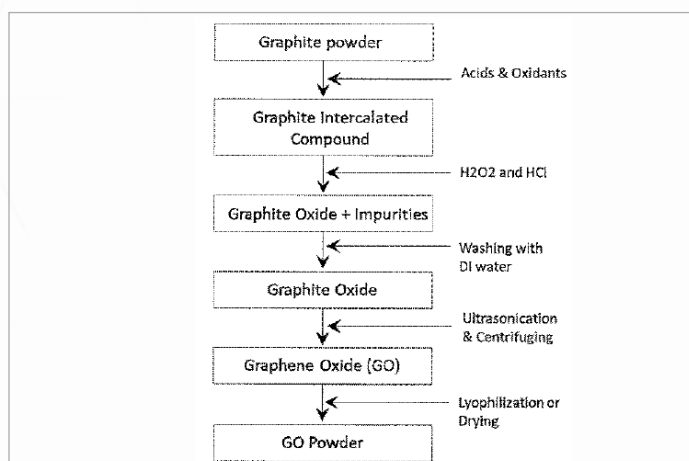
Virginia Tech researchers have developed a novel one-pot production process for graphene production. The process requires only one acid and no oxidants, which greatly simplifies production compared to current methods. The researchers used abundantly available coal as the raw material to further reduce cost. The new process also produces less hazardous waste than what is currently available, making production much more environmentally friendly. This production improvement has the potential to make graphene a commercially exploitable product in practical applications including thermal interface materials, anti-corrosion coating, rubber composites for tires, lightweight and impact-resistant composites for automobiles, humidity sensors, actuators, water purification, and desalination.

Main benefits include:

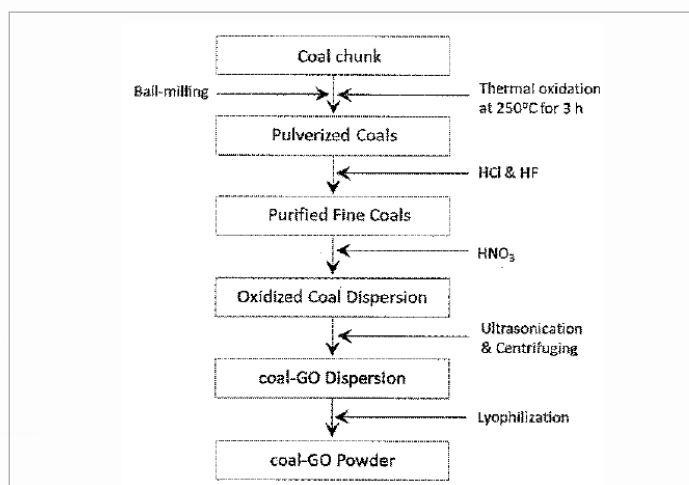
- Order of magnitude price reduction
- Simplification
- Eco-friendly



Typical molecular models of graphene and graphene oxide.



A brief description of the typical Hummers’ method for graphite-derived graphene.



A brief description of the one-pot chemical route for coal-derived graphene oxide.



CONTACT:

Grant Brewer
grantb76@vt.edu
 540-231-6648