

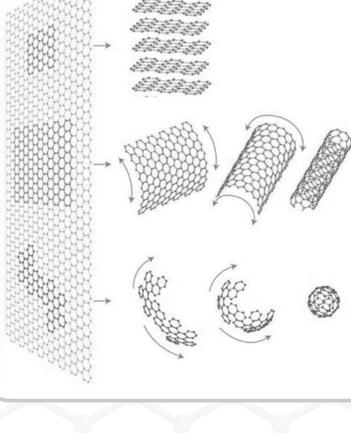
Understanding Graphene

Graphene's unique combination of extraordinary properties offers a fascinating material platform for the development of next-generation technologies in many areas – wearable and superfast electronics, ultrasensitive sensors, multifunctional composites & coatings, membranes, medicine & biotechnology, energy harvesting & storage.



Graphene is the name for a honeycomb sheet of carbon atoms. Its striking physical, electronic, and mechanical properties originate from the two-dimensional (2D) electron confinement within a one-atom-thick layer.

Graphene sheets are building blocks for other graphitic materials^[24]...



stacked on top of each other they make **graphite** (1 mm thick graphite contains about 3 million layers of graphene)

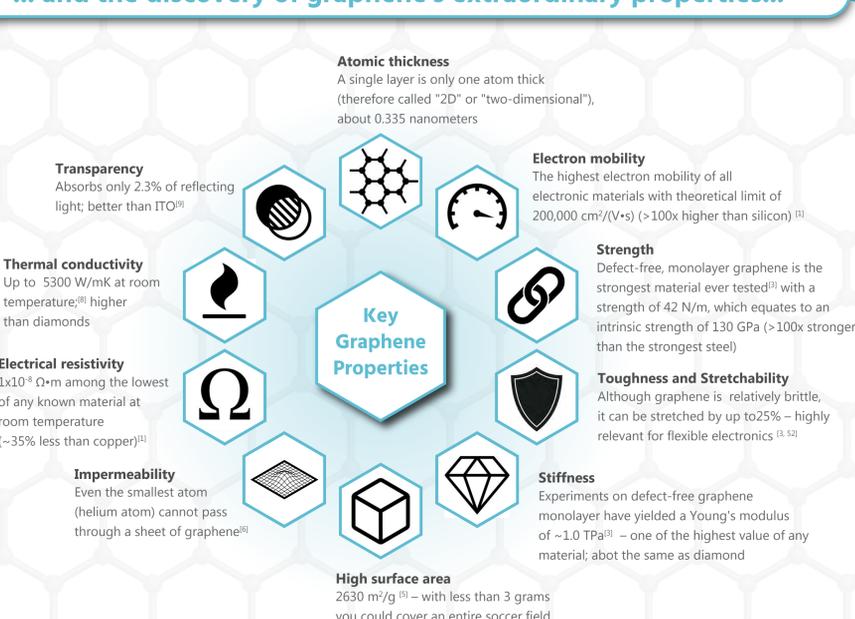
rolled up they make a **carbon nanotube**

cut and folded into a spherical shape they make a **fullerene**

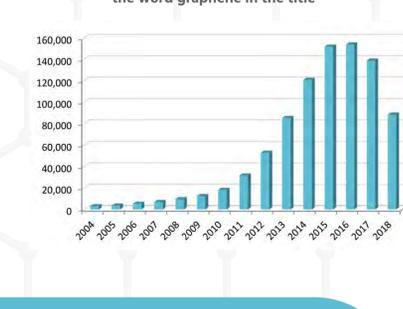
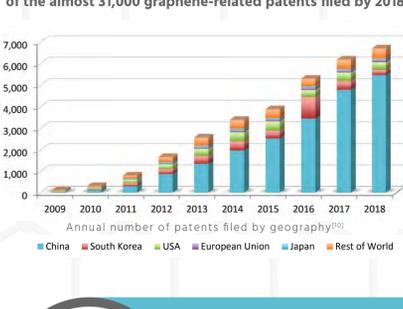
First isolated in 2004, the Nobel Prize in Physics 2010 was awarded jointly to Andre Geim and Konstantin Novoselov "for ground-breaking experiments regarding the two-dimensional material graphene".^[11,12]



... and the discovery of graphene's extraordinary properties...



...has led to a stampede in research and development and a patent land rush with 31,000 patents and hundreds of thousands of scientific papers...



There are well over 100 graphene producers worldwide^[14] and growing. The estimated market value for graphene: €100 million in 2020; €150-550 million in 2025^[15]

... making graphene the 'new plastics': there appear to be ubiquitous applications in nearly every field...

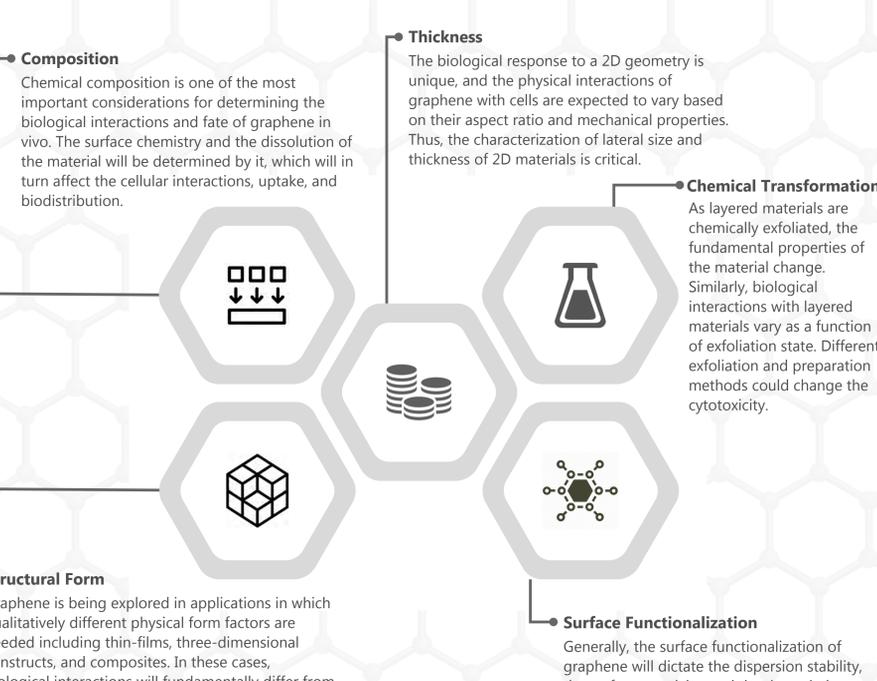


The greatly varying quality of graphene raw material available on the market is holding back product development. Many device applications require pristine and defect-free graphene, yet contamination and mislabeling plagues most commercially available graphene.^[27] Standards for graphene like ISO^[28] could help boost commercialization.



...although Environmental, Health & Safety (EHS) risks are not yet well understood and need to be fully investigated

Based on the current knowledge on hazards of nanomaterials, a number of characteristics can be identified that may be relevant for hazard assessment of graphene.^[25, 26]



Find out more about graphene and its applications

Sources:

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