Adsorption by activated carbon produced from lignite

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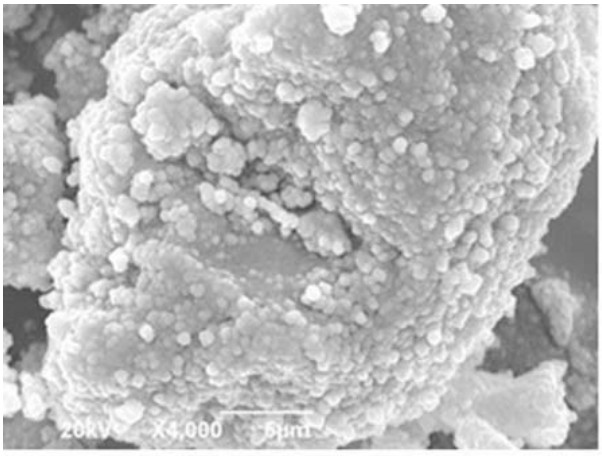
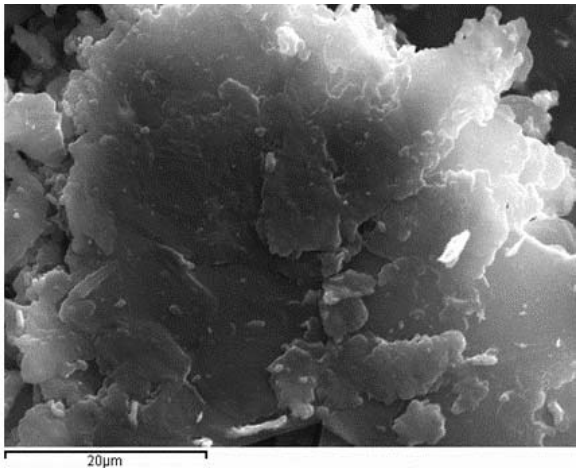
Lignite is a low-quality carbonaceous fuel in geological transition from peat to hard coal. Vast accessible deposits have made lignite, or brown coal, a preferred energy source in Central Europe, the eastern Mediterranean region, and Australia. Burning a tons of lignite produces only about a ton of carbon dioxide (CO2), since the mined fuel contains two-thirds water and impurities. However, correspondingly greater quantities of waterlogged lignite are required for electricity generation, emitting over twice the carbon dioxide of hydrogen-rich natural gas. However, the increasing demand for transition to renewable energy sources, make lignite a tremendous environmental pollution source. Thus, lignite as a precursor for useful materials such as graphene, gives value to its exploitation.

The process is based on the utilization of lignite produced in abundance from power industry in Greece and its conversion to graphene. The method proposed has an advantage over the rest so far because a smaller amount of energy is required for the final composition. This has as a result highly energy-intensive intermediate stages of standard conversion are bypassed of lignite to graphene: a) conversion of lignite to carbon, b) activation of carbon to activated carbon, c) conversion of activated carbon to graphite, d) conversion of graphite to graphene oxide, e) conversion of graphite oxide to its oxide graphene, f) reduction of graphene oxide to graphene. The finished product is of high purity graphene (77%) from lignite (zero purchase cost).



Graphene oxide



Graphene

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