

# **State of the art and future perspectives of traditional carbon materials and new carbon forms**

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Carbon materials cover a wide range of structures and may exhibit very different properties. Traditional carbon materials such as carbon fibers, activated carbons or carbon-based composites, mainly prepared from petroleum or coal derivatives, served from centuries as a vanguard in several industrial applications and are still nowadays the worldwide leaders in carbon material's production. The recent discovery of new carbon forms such as graphene presages a revolution in the field, although this expected tendency is still only observed at a scientific level. A detailed discussion of the worldwide evolution at an industrial and scientific level of traditional carbon materials and the new carbon forms will be the focus of the work. In this regard, some relevant results obtained by our group in both traditional carbon materials (carbon fibers, activated carbons and activated carbon fibers, composites) and graphene materials are also presented. These include some recent advances in their preparation from coal and petroleum derivatives, (mainly pitch-based), such as new developments in the preparation of activated carbon fibers or examples of controlling the growing of the liquid crystal phase during carbonization thus controlling the final texture of cokes, graphites or graphenes. Information about their use in different applications such as structural and environmental ones (air/water purification, desalination, water splitting, etc.), catalysis, health or energy storage, will be also discussed.

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