

Self-standing synthesis graphene on the carbon fiber surface

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Graphene has unique characteristics chemically, biochemically and physically with flat monolayer 2D structure. To put graphene into practical use taking advantage of these unique properties, it is required to maintain the self-standing structure while preventing aggregation, stacking and adhesion of graphene due to Van der Waals force. If graphene is stably stacked in multiple layers, graphite is formed, and advantageous functions of graphene are lost.

CVD reaction to obtain graphene by calcinations of raw material derived from phenol resin fiber heat-treated moderately and the remaining hydrogen content adjusted under high-pressure and isotropic gas pressure [1]. H_2 and CH_4 generated from the raw materials of calcined resin fiber form the graphene on the fiber surface without any catalyst. It is possible to form a few layers of graphene showing self-standing structure on all of carbon fiber surface which is simultaneously carbonized. In this synthetic process, yarn, woven cloth, non-woven cloth and other types of resin fibers are applicable, and graphene formed on the surface of these fibers have identical self-standing stable structure.

The self-standing synthesized graphene on the carbon fiber cloth is directly used for the electrode of field emission devices [2], secondary batteries and fuel cells exhibiting unique performance.

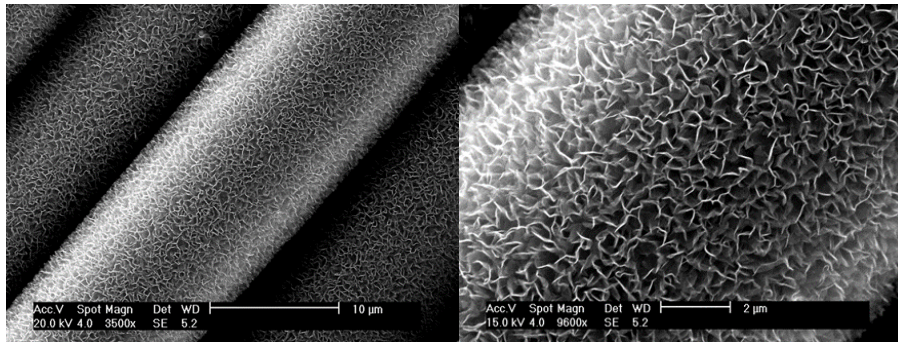


Fig.1 Self-standing synthesis graphene on the carbon fiber surface

References

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- [2] Yusuke Iwai, Kazuo Muramatsu, Shougo Tsuboi, Atsuo Jyouzuka, Tomonori Nakamura, Yoshihiro Onizuka and Hidenori Mimura, 2013 Appl. Phys. Express **6** 105102