

SUPERTHIN COMBINED PVA-GRAPHENE FILM

by

Hai-Yan KONG and Ji-Huan HE*

National Engineering Laboratory for Modern Silk,
College of Textile and Clothing Engineering,
Soochow University, Suzhou, China

Short paper

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Superthin polyvinyl alcohol graphene sheet of several nanometers in thickness is obtained by the electrospinning. Polyvinyl alcohol (10 wt.%) solution with the additive of ash (0.5 wt.%) is used for this purpose.

Key words: *graphene, film, electrospinning, bubble-electrospinning*

Introduction

Graphene is a rapidly rising star on the horizon of materials science and thermal science as well. This strictly 2-D material exhibits exceptionally high crystal and electronic quality, and, despite its short history, has already revealed a cornucopia of new physics and potential applications [1]. Ash is an assembly of several allotropes of carbon, including graphite and amorphous carbon, an isolated atomic plane of graphite forms a graphene. In this paper ash is used as an additive for fabrication of superthin films.

Experimental

Polyvinyl alcohol (PVA) with a degree of 1750 \pm 50 was dissolved into distilled water with the temperature 25.2 °C and the humidity 45%, then the mixture was stirred with the aid of electromagnetic stirrer at 90 °C for 3 hours to get homogeneous and transparent solution, and cooled to the room temperature before the experiment. The PVA concentration was 10 wt.%. Then some plant charcoal ash was added gradually into the PVA solution until its concentration is 0.5 wt.%. The mixed solution was then put into the ultrasonic cell disruption system for 60 minutes to make them homogeneously mixed. The solution was placed in a 10 mL syringe, and the needle tip with a diameter 0.7 mm was connected to a D. C. high-voltage generator via an alligator clip. A flat piece of aluminum foil, placed 10 cm before the needle tip was served as the collector for the electrospinning fibers depositing. The voltage applied was maintained at 20 kV. The samples were pasted on an scanning electron microscope (SEM) disk and coated with gold before being observed through SEM, and superthin combined PVA-graphene film was observed, fig. 1.

* Corresponding author; e-mail: hejihuan@suda.edu.cn

Discussion and conclusions

The graphite in the mixed solution, a polymorph of the element carbon, might move onto a sheet under a high electronic force, and this is very reason to form a very long but extremely thin film. The amorphous carbon in the mixed solution might be mixed into the fibers as shown in fig. 1. This technology can be easily applied to the bubble electrospinning [2]. The present technology provides the simplest way to produce graphene-like sheets with many potential applications [3].

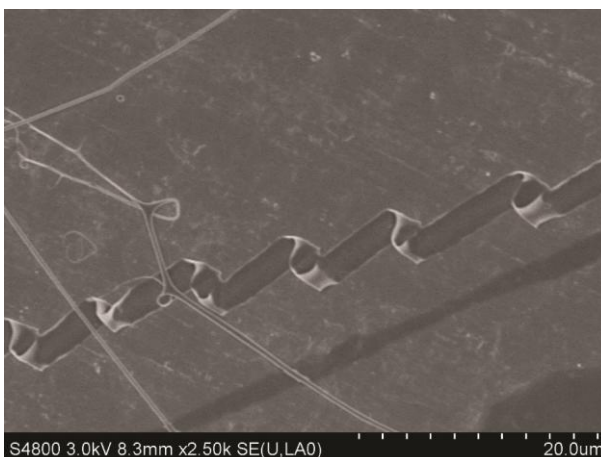


Figure 1. SEM photography of superthin combined PVA-graphene film, the thickness is about 4 nm

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