

A Modified Process for Improving the Properties of Carbon Nanotube Spun Yarn.

This paper reports on an improved process for the dry spinning of carbon nanotubes (CNT) into yarn. Subsequent yarn properties of tensile strength and electrical conductivity have been studied and enhanced through different techniques, hence opening up application areas in nano textiles and biomedical devices.

The new spinning process is defined within 3 stages: (i) Forming a CNT triangle web of enough length where the CNT bundles' bonding is weak; (ii) drafting CNT bundles in yarn; and (iii) twisting yarn of a given alpha twist factor (Figure 1).

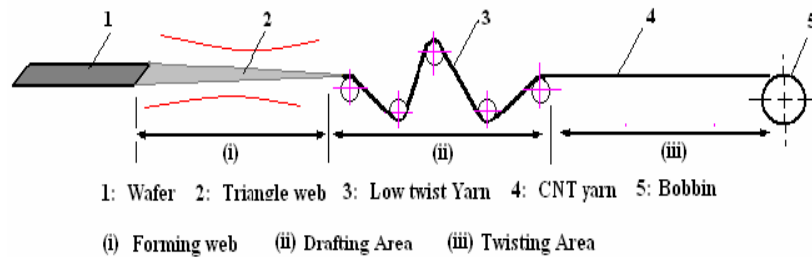


Figure 1: The schematic of modified CNT yarn spinning.

The partition of the spinning process into three stages allows; (i) control of the length and tension uniformity of the CNT web; (ii) better alignment of the CNT bundles when low twist yarn goes through the drafting system; (iii) different stages of the mechanical and structural features of web and yarn to be separated; and (iv) treatments of the individual stages such as heat treatment on web area or yarn area, micro-carding, magnetizing CNT web [1][2].

The methodology also lends itself to the manufacture of CNT composite yarns (Figure 2) thereby opening up new application areas and further details and results will be reported.

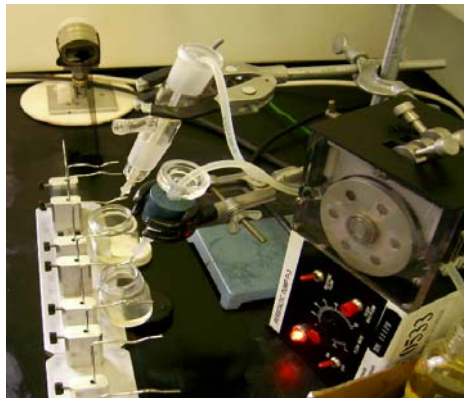


Figure 2: The manufacturing CNT composite yarn at CSIRO.

REFERENCES

[1] Smith, S.M. and Tran, C.D., Carbon Nanotube Yarn: Improving the Properties of Carbon Nanotubes Yarns, CSIRO Niche Manufacturing Flagship Retreat & Science Symposium, 15-16 May 2008.

[2] Tran, C.D., Smith S.M., Humphries W. and Lucas S., Improving the Tensile Strength of Dry-Spun Carbon Nanotube Yarns, in preparation, 2008.