

Contribution (Oral/Poster/Keynote)

Formation of Graphene Nanoribbons in Solution**M. C. Paiva¹**, E. Cunha¹, M. F. Proença², R. F. Araújo², F. Costa³, A. J. Fernandes³, M. A. Ferro⁴¹ Instituto de Polímeros e Compósitos/I3N, Universidade do Minho, Campus de Azurém, 4800-058 Guimarães, Portugal² Departamento de Química, Universidade do Minho, Campus de Gualtar, 4710-057 Braga, Portugal³ FSCOSD/I3N, Universidade de Aveiro, Campus Universitário de Santiago, 3810-193 Aveiro⁴ CICECO, Complexo de Laboratórios Tecnológicos, Campus Universitário de Santiago, 3810-193 Aveiro, Portugalmcpaiva@dep.uminho.pt

Recently, the formation of graphene by exfoliation of carbon nanotubes (CNT) has shown increasing interest. This process originates graphene nanoribbons (GNR) that are expected to present excellent electrical properties, depending on their width and on their edge shape [1]. Several methods for the unzipping of graphene from CNT were proposed along the past few years [2-6]. These methods often present some limitation, such as low yield of GNR, or extensively oxidized GNR without electrical conductivity.

Recently, the formation of GNR was observed “in situ” by unzipping of carbon nanotubes under ultra-high vacuum scanning tunneling microscopy (UHV STM) [7]. The CNT under observation were functionalized by the 1,3-dipolar cycloaddition reaction [8]. This particular functionalization route seems to be responsible for the unzipping of the CNT under STM imaging conditions.

The present work demonstrates the formation of GNR in solution by unzipping of functionalized CNT, in different solvents. The GNR thus formed were analyzed by UV-vis and Raman spectroscopy, and by transmission electron spectroscopy. GNR bundles were deposited from an ethanol solution and observed by TEM, as depicted in Figure 1.

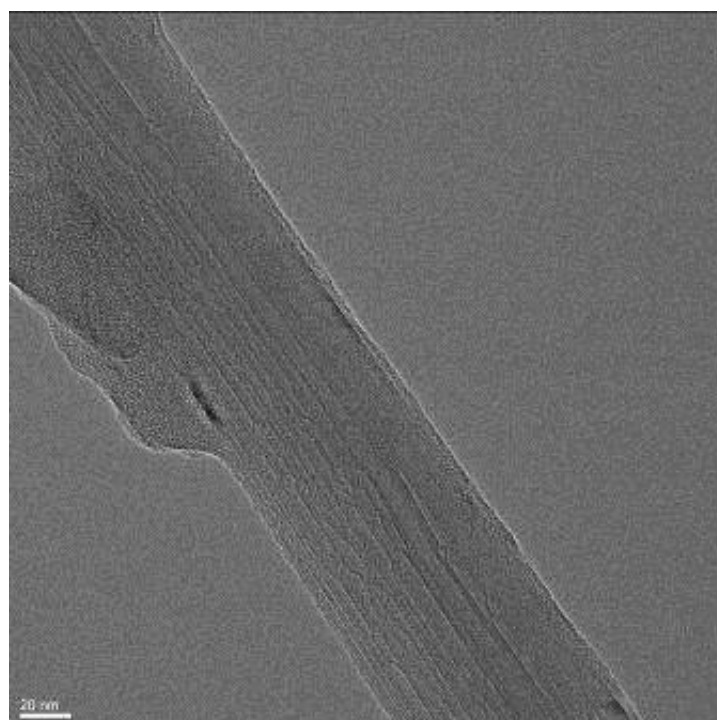


Figure 1. TEM of GNRs obtained by unzipping of CNT in ethanol.

References

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Figure 1. TEM of GNRs obtained by unzipping of CNT in ethanol.