GraphenE-orgaNIc hybrid architectures for organic electronics: a mUltiSite training action

From 2010-12-01 to 2014-11-30, closed project

Objective

GENIUS aims at offering highest-quality supra-sectoral and cross-disciplinary training to a pool of promising young researchers, in an area at the interface between Supramolecular Chemistry, Materials- and Nano-Science, Physics and Electrical Engineering. GENIUS appointees will be trained in lecture courses, dedicated schools and workshops, and through an ambitious and carefully planned research activity that benefits both from the expertise of world-leading PIs with remarkable track records in both training and research. GENIUS is designed to generate new scientific and technological knowledge on the production, processing and characterization of graphene based supramolecular architectures, taking advantage of the outstanding physical and electronic properties of graphene. We are particularly interested in developing and studying a new graphene-organic hybrid material (GOH) for applications in microelectronics; the new material proposed, while maintaining the excellent properties of classical graphene, will have improved processability in solution, chemical functionalization and tunable optoelectronic properties.

We will use supramolecular interactions to cover single graphene sheets with polycyclic aromatic hydrocarbon molecules, i.e. nano-graphenes (NG), which are composed of i) an aromatic core able to interact strongly with graphene, and ii) flexible side chains to provide solubility in organic solvents. NGs adsorb reversibly on graphene by pi-pi interactions, forming ordered adlayers on its surface with pre-programmed molecule spacing and orientation, ultimately modulating the electronic properties of the GOH.

The interaction of NG and graphene will be studied at macroscopic scale by optical, Raman and current-voltage spectroscopy, and at molecular and microscopic scales primarily by Scanning Probe Microscopies. As a proof of principle, field effect transistors and photovoltaics devices based on graphene-NG composites will be tested.

Related information

Report Summaries

Final Report Summary - GENIUS (GraphenE-orgaNIc hybrid architectures for organic electronics: a mUltiSite training action)
**Coordinator**

CONSIGLIO NAZIONALE DELLE RICERCHE  
PIAZZALE ALDO MORO 7  
00185 ROMA  
Italy  

**EU contribution:** EUR 904 187

See on map

**Activity type:** Research Organisations

**Administrative contact:** Roberta Chiodini
Tel.: +39 051 6399770  
Fax: +39 051 6399844

Contact the organisation

**Participants**

BASF SE  
CARL BOSCH STRASSE 38  
67063 LUDWIGSHAFEN AM RHEIN  
Germany  

**EU contribution:** EUR 292 709

See on map

**Activity type:** Private for-profit entities (excluding Higher or Secondary Education Establishments)

**Administrative contact:** Michael Roeper
Tel.: +49 621 6055243  
Fax: +49 6216078502

Contact the organisation

MAX-PLANCK-GESELLSCHAFT ZUR FORDERUNG DER WISSENSCHAFTEN EV  
HOFGARTENSTRASSE 8  
80539 Munich  
Germany  

**EU contribution:** EUR 449 029

See on map

**Activity type:** Other

**Administrative contact:** Klaus Muellen
Tel.: +496131379150  
Fax: +496131379350

Contact the organisation
THE CHANCELLOR MASTERS AND SCHOLARS OF THE UNIVERSITY OF CAMBRIDGE  
TRINITY LANE THE OLD SCHOOLS  
CB2 1TN CAMBRIDGE  
United Kingdom  
**EU contribution:** EUR 527 445

Trinity Lane The Old Schools

**Activity type:** Higher or Secondary Education Establishments

**Administrative contact:** Keith Cann
Tel.: +44 1223 333543
Fax: +44 1223 332988

UNIVERSITE DE MONS  
PLACE DU PARC 20  
7000 MONS  
Belgium  
**EU contribution:** EUR 452 259

Place du Parc 20

**Activity type:** Higher or Secondary Education Establishments

**Administrative contact:** David Beljonne
Tel.: +3265373872

UNIVERSITE DE STRASBOURG  
RUE BLAISE PASCAL 4  
67081 STRASBOURG  
France  
**EU contribution:** EUR 497 783

Rue Blaise Pascal 4

**Activity type:** Higher or Secondary Education Establishments

**Administrative contact:** Sandrine Schott-Carriere
Tel.: +33688851124
Fax: +33 3 68 85 5161

UNIVERSITY COLLEGE LONDON  
GOWER STREET  
WC1E 6BT London  
United Kingdom  
**EU contribution:** EUR 527 446

Gower Street

**Activity type:** Other

**Administrative contact:** Greta Borg-Carbott
Tel.: +442031083033
Fax: +442078132849
HUMBOLDT-UNIVERSITAET ZU BERLIN
UNTER DEN LINDEN 6
10117 BERLIN
Germany

See on map

Activity type: Higher or Secondary Education Establishments

Administrative contact: Brigitte Lehmann
Tel.: +493020931636
Fax: +493020931660

Contact the organisation

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