LIGHT ELEMENT MOLECULAR SUPERCONDUCTIVITY: AN INTERDISCIPLINARY APPROACH

Fact Sheet

Project Information

LEMSUPER

Grant agreement ID: 283214

Project website

Project closed

Start date
1 October 2011

End date
31 March 2015

Funded under
Specific Programme "Cooperation": Nanosciences, Nanotechnologies, Materials and new Production Technologies

Total cost
€ 2 167 505,80

EU contribution
€ 1 606 660,00

Coordinated by
UNIVERSITY OF DURHAM
United Kingdom

Objective

This project will develop methodology for the design of light element (B, C, O) cluster/molecule-based superconducting systems with higher transition temperatures. This will be achieved by integrating chemical synthesis of new materials with physical control of electron density and delocalisation underpinned by theoretical understanding benchmarked against evidence from advanced spectroscopies and electronic property measurements to provide a unique

multidisciplinary training environment. The consortium brings together ten world-leading EU/Japan groups in chemical design/materials synthesis (Liverpool/Okayama/Mainz/Aoyama Gakuin), physical control methods at extreme pressures/high electric fields (Osaka/Tokyo), evaluation of structural and electronic properties (Durham/Ljubljana) and theory and simulation (Trieste/Tokyo). The step change in the properties of molecular superconductors and the fundamental understanding of the novel competing electronic ground states from which superconductivity will emerge will be achieved by focussing on light element materials in which a fine balance exists between electron-phonon coupling and the electron correlations recently identified as significant in these systems. The rich diversity of molecular materials classes with high frequency phonons implicated in phonon-driven mechanisms of superconductivity and the ability to systematically control the importance of co-existing electron correlations in these narrow band systems by chemical and physical means justify our choice of targets. Light elements are cheap, abundant, non-toxic and environmentally benign and thus ideal candidates for sustainable energy-saving superconductor technologies without the need to use toxic and/or rare elements. The discovery of light element molecular superconductors with figures-of-merit needed for applications is a grand challenge requiring the fundamental research proposed here to identify proof-of-concept materials and scientific understanding.

Fields of science (EuroSciVoc)

natural sciences > physical sciences > **atomic physics**

natural sciences > physical sciences > electromagnetism and electronics > **superconductivity**

natural sciences > physical sciences > optics > **spectroscopy**

Programme(s)

FP7-NMP - Specific Programme "Cooperation": Nanosciences, Nanotechnologies, Materials and new Production Technologies

Topic(s)

NMP.2011.2.2-6 - Fundamental properties of novel superconducting materials (coordinated call with Japan)

Call for proposal

FP7-NMP-2011-EU-Japan
See other projects for this call

Funding Scheme

CP-FP - Small or medium-scale focused research project

Coordinator

UNIVERSITY OF DURHAM

EU contribution

€ 389 778,80

Total cost

No data

Address

STOCKTON ROAD THE PALATINE CENTRE
DH1 3LE Durham
United Kingdom

Region

North East (England) > Tees Valley and Durham > Durham CC

Activity type

Higher or Secondary Education Establishments

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Participants (5)

THE UNIVERSITY OF LIVERPOOL

United Kingdom

EU contribution

€ 330 451,20

Address

BROWNLOW HILL 765 FOUNDATION BUILDING
L69 7ZX Liverpool

Region

North West (England) > Merseyside > Liverpool

Activity type

Higher or Secondary Education Establishments

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Total cost

No data

INSTITUT JOZEF STEFAN

Slovenia

EU contribution

€ 265 442,00

Address

Jamova 39
1000 Ljubljana

Region

Slovenija > Zahodna Slovenija > Osrednjeslovenska

Activity type

Research Organisations

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Total cost

No data

SCUOLA INTERNAZIONALE SUPERIORE DI STUDI AVANZATI DI TRIESTE

Italy

EU contribution

€ 290 256,00

Address

VIA BONOMEA 265
34136 Trieste

Region

Nord-Est > Friuli-Venezia Giulia > Trieste

Activity type

Higher or Secondary Education Establishments

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Total cost

No data

JOHANNES GUTENBERG-UNIVERSITAT MAINZ

Germany

EU contribution

€ 59 171,25

Address

SAARSTRASSE 21
55122 Mainz

Region

Rheinland-Pfalz > Rheinhessen-Pfalz > Mainz, Kreisfreie Stadt

Activity type

Higher or Secondary Education Establishments

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Total cost

No data

MAX-PLANCK-GESELLSCHAFT ZUR FORDERUNG DER WISSENSCHAFTEN EV

Germany

EU contribution

€ 271 560,75

Address

HOFGARTENSTRASSE 8
80539 Munchen

Region

Bayern > Oberbayern > München, Kreisfreie Stadt

Activity type

Research Organisations

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Total cost

No data

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