

## Materials for Sustainable Energy Technologies MRes

Postgraduate combined research and teaching degree course/programme Materials for Sustainable Energy Technologies MRes:

This EPSRC-sponsored programme can be taken on a full- or part-time basis. The programme comprises one major research project in Materials for Sustainable Energy Technologies, which can be based in the University or in industry, plus six taught modules, five compulsory and one optional.

**Study here and find out why the University of Birmingham was awarded The Times and The Sunday Times University of the Year 2013-14 (<http://www.birmingham.ac.uk/news/latest/2013/09/20-sep-Birmingham-announced-as-University-of-the-Year.aspx>)**

### Course fact file

**Type of Course:** Combined research and taught

**Study Options:** Full time, part time

**Duration:** 1 year full-time, 2 years part-time

**Start date:** Contact the School directly for further information

### Related courses

[Biomaterials MRes \(/postgraduate/courses/combined/metallurgy-materials/biomaterials-mres.aspx\)](/postgraduate/courses/combined/metallurgy-materials/biomaterials-mres.aspx)

[Science and Engineering of Materials MRes \(/postgraduate/courses/combined/metallurgy-materials/science-engineering-materials.aspx\)](/postgraduate/courses/combined/metallurgy-materials/science-engineering-materials.aspx)

[Postgraduate programmes - School of Metallurgy and Materials \(/schools/metallurgy-materials/postgraduate-courses/index.aspx\)](/schools/metallurgy-materials/postgraduate-courses/index.aspx)

### Contact

Mrs Jenny Henderson

Tel: +44 (0)121 414 5222

Email: [j.henderson@bham.ac.uk](mailto:j.henderson@bham.ac.uk) (<mailto:j.henderson@bham.ac.uk>)

[School of Metallurgy and Materials \(/schools/metallurgy-materials/index.aspx\)](/schools/metallurgy-materials/index.aspx)

[Follow us on Twitter \(http://twitter.com/eps\\_unibham\)](http://twitter.com/eps_unibham)

### Details

This EPSRC-sponsored programme can be taken on a full- or part-time basis. The programme comprises one major research project in Materials for Sustainable Energy Technologies, which can be based in the University or in industry, plus six taught modules, five compulsory and one optional.

The five compulsory modules are:

- Introduction to Materials\*
- Materials for Sustainable Environmental Technologies
- Materials Characterisation
- Effective Project Management
- Presentation and Communication Skills/Team Skills Development

You may choose one (or two\*) options from:

- Materials for Hydrogen and Fuel Cell Technologies
- Materials for Energy Generation and Storage
- Functional Materials

\*If you have a background in Materials Science, you will take an additional option in place of Introduction to Materials.

We recommend that you start the course at the beginning of the academic year. However, if your background is in Materials Science, then you may start at any time of the year.

### Related links

- [Postgraduate programmes - School of Metallurgy and Materials \(/schools/metallurgy-materials/postgraduate-courses/index.aspx\)](/schools/metallurgy-materials/postgraduate-courses/index.aspx)

### Why study this course



“New sustainable energy technologies invariably depend on advances in the application of Materials Science. These technologies will play a vital role in reducing green house gas emissions and in conserving vital raw materials.”  
Professor Rex Harris FREng, Metallurgy and Materials

The University of Birmingham has been active in [energy research for more than a century \(/research/activity/energy/index.aspx\)](/research/activity/energy/index.aspx), with more than 100 academics currently active in this area. We are a partner in the Midlands Energy Consortium, with the University of Nottingham and Loughborough University.

[Metallurgy and Materials \(/schools/metallurgy-materials/index.aspx\)](/schools/metallurgy-materials/index.aspx) is one of the largest centres for materials research in the UK. Our Research School comprises more than 20 full-time academic staff in addition to 30 honorary and visiting staff, 30 research fellows and close to 150 postgraduate students. Our diverse research portfolio ranges from fundamental aspects of materials science to practical high performance engineering applications. The School has particularly active R&D activities in: hydrogen energy materials & systems, hard magnetic materials, and functional materials for energy applications.

## Fees and funding

### Tuition fees for home/EU students (2015/2016)

Research programmes (including Masters by research) **£4,090\***

\*Research fees are yet to be confirmed by Research Councils UK, and may change.

#### Part-time programmes

Most part-time programmes run for two years and their fees are one half of the standard full-time programme fees.

### Tuition fees for international students (2015/2016)

International student tuition fees are set at **£17,365**.

For further information please view the [fees for international students \(http://www.birmingham.ac.uk/international/students/finance/fees.aspx\)](http://www.birmingham.ac.uk/international/students/finance/fees.aspx) page.

#### Part-time programmes

UK student visa regulations mean that students classed as overseas for fees purposes may normally only register on a full-time basis.

Learn more about [fees and funding \(/postgraduate/pgt-fees/index.aspx\)](/postgraduate/pgt-fees/index.aspx)

#### Scholarships and studentships

Scholarships may be available. International students can often gain funding through overseas research scholarships, Commonwealth scholarships or their home government.

For further information contact the School directly or email [sfo@contacts.bham.ac.uk \(mailto:sfo@contacts.bham.ac.uk\)](mailto:sfo@contacts.bham.ac.uk)

## Entry requirements

An upper second-class Honours degree or equivalent in Materials Science or Engineering

Learn more about [entry requirements \(/postgraduate/requirements-pgt/index.aspx\)](/postgraduate/requirements-pgt/index.aspx)

#### International students

We accept a range of qualifications from different countries – learn more about [international entry requirements \(/postgraduate/requirements-pgt/international/index.aspx\)](/postgraduate/requirements-pgt/international/index.aspx)

[Standard English language requirements \(/postgraduate/requirements-pgt/international/index.aspx\)](/postgraduate/requirements-pgt/international/index.aspx) apply

## How to apply

Learn more about [applying \(/postgraduate/courses/apply-pg/index.aspx\)](/postgraduate/courses/apply-pg/index.aspx)

When clicking on the Apply Now button you will be directed to an application specifically designed for the programme you wish to apply for where you will create an account with the University application system and submit your application and supporting documents online. Further information regarding how to apply online can be found on the [How to apply pages \(http://www.birmingham.ac.uk/students/courses/postgraduate/apply-pg/index.aspx\)](http://www.birmingham.ac.uk/students/courses/postgraduate/apply-pg/index.aspx)

[Apply now \(https://pga.bham.ac.uk/lpages/EPSo47.htm\)](https://pga.bham.ac.uk/lpages/EPSo47.htm)

[Apply now \(https://pga.bham.ac.uk/lpages/EPSo47.htm\)](https://pga.bham.ac.uk/lpages/EPSo47.htm)

## Related links

[Postgraduate programmes - School of Metallurgy and Materials \(/schools/metallurgy-materials/postgraduate-courses/index.aspx\)](/schools/metallurgy-materials/postgraduate-courses/index.aspx)

## Learning and teaching

### Examples of MRes in Materials for Sustainable Energy Technologies (MRes-MSET) Research Projects

- Nanostructured Mg materials for H<sub>2</sub> storage & batteries – [Dr David Book \(/staff/profiles/metallurgy/book-david.aspx\)](/staff/profiles/metallurgy/book-david.aspx) & [Dr Allan Walton \(/staff/profiles/metallurgy/walton-allan.aspx\)](/staff/profiles/metallurgy/walton-allan.aspx)
- Magnesium alloys thin films for H<sub>2</sub> storage & sensing – [Dr David Book \(/staff/profiles/metallurgy/book-david.aspx\)](/staff/profiles/metallurgy/book-david.aspx)
- Complex hydrides for H<sub>2</sub> storage & batteries – [Dr David Book \(/staff/profiles/metallurgy/book-david.aspx\)](/staff/profiles/metallurgy/book-david.aspx) & Dr Daniel Reed
- Nanocarbons for batteries and hydrogen storage – [Dr David Book \(/staff/profiles/metallurgy/book-david.aspx\)](/staff/profiles/metallurgy/book-david.aspx)
- Porous materials for hydrogen and methane storage – [Dr David Book \(/staff/profiles/metallurgy/book-david.aspx\)](/staff/profiles/metallurgy/book-david.aspx)
- Novel materials for thermal energy storage – [Dr David Book \(/staff/profiles/metallurgy/book-david.aspx\)](/staff/profiles/metallurgy/book-david.aspx)
- Dense metal membranes for hydrogen purification – [Dr David Book \(/staff/profiles/metallurgy/book-david.aspx\)](/staff/profiles/metallurgy/book-david.aspx) Dr David Book & Dr John Speight

- Solid-state hydride beds for storage & compression – [Dr David Book \(/staff/profiles/metallurgy/book-david.aspx\)](#) & [Professor I Rex Harris \(/staff/profiles/metallurgy/harris-rex.aspx\)](#)
- Recycling of rare-earth magnets – [Dr Allan Walton \(/staff/profiles/metallurgy/walton-allan.aspx\)](#)
- Hydrogen process of magnetic materials – [Dr Allan Walton \(/staff/profiles/metallurgy/walton-allan.aspx\)](#)
- Corrosion of bipolar plates in PEM fuel cells – [Dr Alison Davenport \(/staff/profiles/metallurgy/davenport-alison.aspx\)](#)
- Nanostructured thermoelectric materials – [Dr Mark Laver \(/staff/profiles/metallurgy/laver-mark.aspx\)](#)

Additional projects may be available; contact academic staff in Metallurgy and Materials, Chemistry, Mechanical Engineering, or Chemical Engineering.

## Research Overview

Our research facilities for materials preparation range from vacuum melting and casting for special alloys, through crystal growth equipment for rare-earth and very reactive alloys to melt-spinning facilities for the production of rapidly cooled alloys, atomizers to make metal powders and laser ablation & sputtering equipment for the production of thin films.

The hydrogen technology laboratory has a range of equipment to characterize the properties of materials in hydrogen. This includes constant pressure thermogravimetric analysers, volumetric PCT systems to measure the uptake and sorption kinetics of hydrogen storage materials; DSC; membrane test systems; in situ XRD; and in situ Raman spectroscopy.



The physical techniques laboratory contains a range of equipment for processes including VSM, dilatometry, differential scanning calorimetry, electrical resistivity and density measurements.

Microstructural assessment is well provided for, with a wide range of optical microscopes and quantitative image analysis, and extensive electron microscope facilities. [The Electron Microscope Centre \(/facilities/electron-microscopy/index.aspx\)](#) has: a CFEI Quanta 3D FEG FIB-SEM; a JEOL 7000F with WDX, EDX and EBSD; and an FEI FEG ESEM with cryo and heating (1500 °C) stages. While the TEMs include a 200 kV FEI Tecnai F20 FEG(S)TEM with PEELS, EDX and HAADF.

## Employability

### Range of Employers for MRes in Materials for Sustainable Energy Technologies (MRes-MSET) Graduates

- Pilkington Group Ltd
- Network Rail Ltd
- Teer Coatings Ltd (Miba Group)
- Renishaw plc
- Capita Symonds Ltd
- Intertek
- Saipem Ltd
- Codan Forsikring, Denmark
- University of Birmingham

### Range of Occupations for MRes-MSET Graduates

- Material Scientist
- Materials Engineer
- Production Manager
- Sustainable Energy Consultant
- PhD student
- Research Fellow
- Lecturer

## University Careers Network

Preparation for your career should be one of the first things you think about as you start university. Whether you have a clear idea of where your future aspirations lie or want to consider the broad range of opportunities available once you have a Birmingham degree, our Careers Network can help you achieve your goal.

Our unique careers guidance service is tailored to your academic subject area, offering a specialised team (in each of the five academic colleges) who can give you expert advice. Our team source exclusive work experience opportunities to help you stand out amongst the competition, with mentoring, global internships and placements available to you. Once you have a career in your sights, one-to-one support with CVs and job applications will help give you the edge.

If you make the most of the wide range of services you will be able to develop your career from the moment you arrive.

Visit the [Careers section of the University website \(https://intranet.birmingham.ac.uk/as/employability/careers/college/eps/index.aspx\)](https://intranet.birmingham.ac.uk/as/employability/careers/college/eps/index.aspx) for further information.



