STORAGE RESEARCH INFRASTRUCTURE ECO-SYSTEM

RI Information sheet 2022

University of Birmingham, RI Birmingham Centre for Energy Storage (BCES)

Thermal Energy Storage

Contact person 1:

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Project Acronym	StoRIES
Call	H2020-LC-GD-2020
Grant Agreement No.	101036910
Project Start Date	01-11-2021
Project End Date	31-10-2025
Duration	48 months

1. Photo

Figure 1 Thermal characterization lab

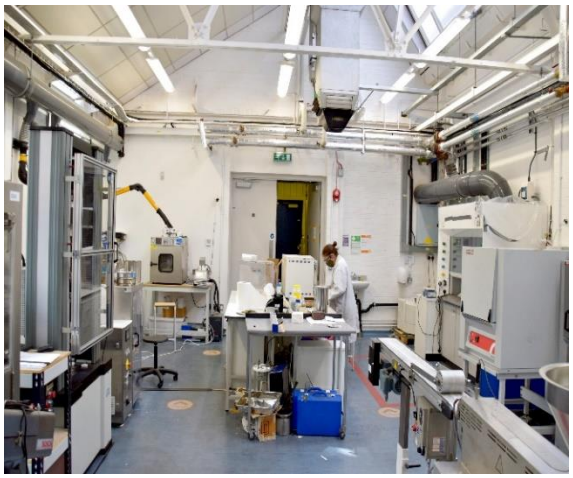

Figure 2 Manufacturing lab

2. Geographical coordinates (˚, “, … N/S, E/W)

Birmingham Centre for Energy Storage (BCES), University of Birmingham (UoB), Edgbaston Park Road, Edgbaston, Birmingham B15 2TT, UK

- 52°26'56.8"N 1°56'10.4"W
- 52°27'13.1"N 1°55'47.6"W

3. Description of the research infrastructure for the webpage

Web site address

BCES at UoB Edgbaston Campus
https://www.birmingham.ac.uk/research/energy/research/centre-energy-storage/index.aspx

Description of the infrastructure

The University of Birmingham Centre for Energy Storage (BCES) & Energy Innovation Centre (BEIC) are cross-campus initiatives with thermal energy storage research hub at the School of Chemical Engineering. Birmingham Centre for Energy Storage (BCES) – Our on-campus laboratories and pilot facilities in The University of Birmingham Edgbaston Campus (operational since 2014)

The BCES (facilities already available) has ~1000 m2 of research labs and offices well-equipped for both fundamental and applied energy storage

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research, as well as a 600m2-pilot-plant for cryogenic (liquid air-based) energy storage integrated with heat and cold storage units (350kW/2.5MWh). Research areas include: thermal (heat and cold) energy storage covering -196 ° C ~ + 1500 ° C; manufacturing technologies and pilot-scale production lines for composite phase change materials (~1 ton/day scale) and composite thermochemical materials (~ 100kg scale); cryogenic air energy storage and their integration; direct wind-to-heat conversion & storage; thermochemical storage (sorption based low to medium temperature storage, reversible reaction-based medium to high-temperature storage, and integrated thermal-chemical and electrochemical conversion

Our unique services and facilities include the following:

- The 350kW/2.5MWh pilot plant for liquid air energy storage integrated with heat and cold storage;
- Lab and pilot-scale facilities for thermal energy storage materials and modules fabrication using an extrusion-based facility for low to medium temperature composite phase change materials (up to 0.5 ton/day) and composite thermochemical material (up to 50kg/day) fabrication;
- Lab and pilot-scale facilities for thermal energy storage materials and modules fabrication using grinding-mixing-granulation-tabletting-drying based facility for medium to high-temperature composite phase change materials (up to 1 ton/day) and composite thermochemical material (up to 100kg/day) fabrication;
- Materials characterization facilities: 4 differential scanning calorimeters (DSC, -170 to +1800 ° C); 4 thermal conductivity meters (-170 to +1800 ° C); 3 particle sizers (nm-to-cm range); a Rheometer (-150 to +700°); 2 thermal cycling machines (-170 to +3000 ° C); 2 mechanical testers (~700 ° C); two contact angle equipment (~1000 ° C); an X-Ray Diffractometer (XRD); an X-Ray Tomography (nano-CT); a Raman microscope; an Scanning Electron Microscope (SEM); a FT-IR; an IR Microscope; 2 TGA (-150 ° C to +1700 ° C); a dilatometer

4. Availability of the research infrastructure

(Please indicate time periods in which infrastructure will not be available for StoRIES in the next 2 years – if already known)

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5. Special considerations (confidentiality / NDA agreements, insurance requirement, special training, HSE training)

- Confidentiality agreement to be signed by both sides of the user and the RI before the work commences, if required.
- All the instruments (item above 25K) in these facilities are covered by the Birmingham University Insurance for safe running.
- The fire safety training, chemical hazard awareness training, building and facility induction, fire induction will be conducted before the work commences.
- The risk assessment and COSHH assessment related to the material testing will be completed by the users and to get approval from the responsible person of the facility before the access of the facilities
- Fully instrument training including the general risk of the instrument operation, basic operational procedure, the method validation, data analysis, instrument running SOP will be given before using the instrument

6. Energy storage technology that can be analysed/studied by using the research infrastructure

- Electrochemical ☐
- Chemical ☒
- Thermal ☒
- Mechanical ☐
- Superconducting Magnetic ☐
- Cross-cutting ☐ (Specifically: ...)

7. Keywords for the webpage

- Thermal Energy Storage
- Composite TES materials
- Thermochemical Energy Storage
- Latent Heat Thermal Energy Storage
- Heating and cooling
- Waste heat recovery
- Thermal management

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8. TRL level (if applicable):
    - 1-3 ☒
    - 4-6 ☒
    - Above ☐

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