DISTINCTIVE – Current Status

Abby Ward
University of Leeds

Theme 2 – PuO_2 and Fuel Residues
12th November 2015
Lancaster University

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Background

- Project started 10th February 2014 to 9th February 2018, although no-cost extension granted to 9th November 2018 (20 months)
- £4.91M EPSRC → total £6.13M, plus £2.23M from industry = £8.36M
- World-class University network

Imperial College London

Lancaster University

Loughborough University

UNIVERSITY OF BIRMINGHAM

University of BRISTOL

UCL

Queen's University Belfast

UNIVERSITY OF LEEDS

MANCHESTER 1824 The University of Manchester

The University Of Sheffield.

University of Strathclyde Glasgow

- Key project partners:

NATIONAL NUCLEAR LABORATORY

NDA Nuclear Decommissioning Authority

Sellafield Ltd

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Theme 2 - Projects

Title of Project	Leading Institution	Researcher	Original Project	Associated Project
Computational modelling of PuO2 ageing and fuel residues	Birmingham	Nathan Palmer	Y	
Understanding the Interfacial Interactions of Plutonium Dioxide with Water	**Lancaster**	**Dr Dominic Laventine**	**Y**	
Real-time fast neutron plutonium assay for plutonium storage and ageing applications.	Lancaster	Rashed Sarwar	Y	
In-situ characterisation of heavily-contaminated plutonium finishing environments	Lancaster		Y	
Understanding surface species and interactions between adsorbed chloride and water on stored PuO2	Manchester	Sophie Sutherland-Harper		Y
Investigation of Anomalous Hydrogen Production from Water Adsorbed on Oxides	Manchester	Jamie Southworth		Y
Understanding the Interfacial Interactions of Plutonium Dioxide with Water	**Manchester**	**Luke Jones**	**Y**	
Simulation of Low-energy Electron Radiolysis of Water Adsorbed on Oxides	Manchester	Marisa Smith		Y
Development of glass-ceramics for Pu disposition using Hot Isostatic Pressing.	Sheffield	Steph Thornber	Y	
Ceramic materials for actinide disposition	**Sheffield**	**Shi-Kuan Sun**	**Y**	
Understanding actinide sorption and binding to cement materials for radioactive waste management	Sheffield	Antonia Yorkshire	Y	
The interaction of water with PuO2 surfaces	UCL	Joseph Wellington		Y
Modelling the surface chemistry of PuO2 at the molecular level	**UCL**	**Dr Bengt Tegner**	**Y**	

- One researcher (PhD) to be recruited
- Nine original projects (four PDRA, five PhDs) & four associated PhDs
- Industrial engagement is key to a success outcome → encourage industrial support where possible

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Theme 2 - Projects

PUO_2 AND FUEL RESIDUES

DISTINCTIVE is a multi-disciplinary collabo
3 key industry partners from across the UK

LANCASTER UNIVERSITY

Understanding the Interfacial Interactions of Plutonium Dioxide with Water

PhD/PDRA – PDRA

Academic Lead – Colin Boxall

Researcher – Dominic Laventine

University – Lancaster University

More than 100 tonnes of Pu are stored at Sellafield as PuO_2 powder in sealed steel storage cans. Under certain circumstances, gas generation may occur within the can with consequent can pressurisation.

This comprises one of the most serious fault scenarios to be considered in the safety cases for PuO_2 storage and avoided in practice. 5 routes to gas production having been suggested:

- Helium accumulation from alpha decay;
- Decomposition of polymeric packing material;
- Steam produced by H_2O desorption from hygroscopic PuO_2 due to self-heating
- Radiolysis of adsorbed water;

Please keep your project details/descriptions up-to-date.

Send any changes to A.M.E.Ward@leeds.ac.uk

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Theme 2 - Publications

- Maddrell E., Thornber S., & Hyatt N. C., The influence of glass composition on crystalline phase stability in glass-ceramic wasteforms. Journal of Nuclear Materials, vol. 456, pp. 461-466.2015.

  DOI: 10.1016/j.jnucmat.2014.10.010

Publications	Further Information
Maddrell E., Thornber S., & Hyatt N. C., The influence of glass composition on crystalline phase stability in glass-ceramic wasteforms. Journal of Nuclear Materials, vol. 456, pp. 461-466.2015. DOI: 10.1016/j.jnucmat.2014.10.010	

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Upcoming Events

Theme Meetings

Theme 1 – AGR, Magnox and Exotic Spent Fuels

Wednesday 21st October, University of Bristol, Tom Scott (t.b.scott@bristol.ac.uk)

Theme 2 – PuO_2 and Fuel Residues

Thursday 12th November, Lancaster University, Colin Boxall (c.boxall@lancaster.ac.uk)

Theme 3 – Legacy Ponds and Silo Wastes

Tuesday 17th November, University of Birmingham, Joseph Hriljac (j.a.hriljac@bham.ac.uk)

Theme 4 – Structural Integrity

Monday 23rd November, University of Strathclyde, Andrea Hamilton (andrea.hamilton@strath.ac.uk)

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Upcoming Events

WM2016 – Dedicated DISTINCTIVE Session

Session: 092 - ESPRC DISTINCTIVE Research Programme
Date: Wednesday, March 09, 2016
Time: 1:30 PM - 5:00 PM

Creativity@Home – Public, Media & Government Engagement School

- June 2016 (likely to be 22nd – 24th)
- Three-day event
- Sheffield (led by Neil Hyatt and Claire Corkhill)

Proposed activities: media training, public engagement, scientific writing and getting published

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Upcoming Events

2nd Annual Meeting

- @Bristol and ssGB
- Researcher/industry/keynote presentations (oral and poster)
- Industry sponsorship opportunities

Welcome suggestions on format

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Any questions?

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