Professor Hugh Evans

Professor of High Temperature Materials

Contact details

Telephone (+44) (0) 121 414 5172 (tel:+44 0 121 414 5172)

Fax (+44) (0) 121 414 7468

Email h.e.evans@bham.ac.uk (mailto:h.e.evans@bham.ac.uk)

School of Metallurgy and Materials

About

Hugh Evans has led research on oxidation and high-temperature coatings at the University of Birmingham since 1992. He has published some 160 research papers in these areas together with reviews and book chapters and a book on the mechanisms of creep fracture. He and his research group have been supported by grants from the Engineering and Physical Sciences Research Council, the Technology Strategy Board, the European Union and from various industrial sectors including aerospace, nuclear and conventional power generation and coatings manufacturers.

Qualifications

Fellow of the Institute of Materials, Minerals and Mining

Chartered Engineer

PhD in metallurgy, University of Wales

BSc in metallurgy, University of Wales

Biography

Prior to joining the University in 1992, Hugh Evans was Head of Corrosion and Fuel Properties at the Berkeley Nuclear Laboratories of the Central Electricity Generating Board. There, he conducted and managed research programmes involving alloy/coolant interactions within nuclear reactor cores. Whilst at Berkeley he also invented a new class of high creep strength fuel cladding alloys reliant on a stable titanium nitride particle dispersion.

Since coming to Birmingham, he has broadened his interests to include high-temperature coatings research in addition to oxidation and mechanical properties. He has published extensively in these areas and is also co-inventor of various coating systems designed to provide protection to alloys under very aggressive environments at high temperatures

He has given numerous invited talks on oxidation, oxide spallation and coatings at international conferences. He is also co-chair of the “Microscopy of Oxidation” conference series.

Postgraduate supervision

- A study of oxide formation on discrete phases in Pt-aluminide coatings.
- Steam oxidation of advanced steels for supercritical boilers.
- Development of high-strength austenitic steels.
- Oxidation and fatigue of turbine disc alloys.
- Fracture damage development in thermal barrier coating systems.

Research

RESEARCH THEMES

The main research themes are to understand, predict and improve the behaviour of metals and alloys at high temperatures, often in chemically aggressive environments.

RESEARCH ACTIVITY

Current research projects are listed below.

- Finite-element modelling of crack growth along contaminated oxide/metal interfaces and predicting oxide spallation.
- Oxidation of advanced nickel-based superalloys.
- Oxidation/fatigue interactions in nickel-based superalloys.
- Creep of high-strength austenitic steels.
- Steam oxidation of iron-based alloys.
- Mechanisms of failure in thermal barrier coating systems.
- Coatings for samarium-cobalt magnetic alloys.
- New high-temperature coating systems to reduce CO_2 emissions from land-based gas turbines.

Publications

Wood, P.D (http://apps.isiknowledge.com/OneClickSearch.do?product=UA&search_mode=OneClickSearch&db_id=&SID=T24ia5A8CoFhJ2PEJB4&field=AU&value=Wood%20PD&ut=000284499000008&pos=1) ., **Evans, H.E (http://apps.isiknowledge.com/OneClickSearch.do?product=UA&search_mode=OneClickSearch&db_id=&SID=T24ia5A8CoFhJ2PEJB4&field=AU&value=Evans%20HE&ut=000284499000008&pos=2)** . and **Ponton, C.B (http://apps.isiknowledge.com/OneClickSearch.do?product=UA&search_mode=OneClickSearch&db_id=&SID=T24ia5A8CoFhJ2PEJB4&field=AU&value=Ponton%20CB&ut=000284499000008&pos=3&cacheurlFromRightClick=no)** ., (2010). Investigation into the wear behaviour of Tribaloy 400C during rotation as an unlubricated bearing at 600^{o}C. **Wear**, 269, 763-769.

Edmonds, I.M., Evans, H.E and Jones, C.N., (2010). The role of the g¢ precipitate dispersion in forming a protective scale on Ni-based superalloys at 750^{o}C. **Oxidation of Metals**, 73, 193-206.

Busso, E.P., Evans, H.E., Qian, Z.Q. and Taylor, M.P., (2010). Effects of breakaway oxidation on local stresses in thermal barrier coatings. **Acta Materialia**, 58, 1242-1251.

Pragnell, W.M., Williams, A.J. and Evans, H.E., (2009). The oxidation morphology of SmCo alloys. **Journal of Alloys and Compounds**, 487, 69-75.

Jackson, R.D., Taylor, M.P. and Evans, H.E., (2009). The effect of bond coat oxidation on the microstructure and endurance of a thermal barrier coating system. **Materials at High Temperatures**, 26, 317-323.

Millward, G.R., Evans, H.E., Jones, I.P., Eley, C.D. and Simpson, K.A., (2009). Burn-off of filamentous carbon and subsequent re-deposition on a 20Cr25Ni stainless steel. **Materials at High Temperatures**, 26, 57-61.

Busso, E.P., Qian, Z.Q., Taylor, M.P. and Evans, H.E., (2009). The influence of bondcoat and topcoat mechanical properties on stress development in thermal barrier coating systems. **Acta Materialia**, 57, 2349-2361.

Pragnell, W.M., Evans, H.E. and Williams, A.J., (2009). The oxidation kinetics of SmCo alloys. **Journal of Alloys and Compounds**, 473, 389-393.

Books and Selected Book Contributions and Reviews

Evans, H.E., (2010), **"**High Temperature Coatings: Protection and Breakdown". In: Richardson, J.A. et al. (eds.) **Shreir's Corrosion,** volume 1, pp. 691-724. Amsterdam, Elsevier.

Tatlock, G.J. and Evans, H.E. (eds), (2009). **Microscopy of Oxidation 7**. Science Reviews, St. Albans, UK.

Evans, H.E., (2008), transl. of Sarrazin, P., Galerie, A. and Fouletier, J., **Mechanisms of High Temperature Corrosion**, Trans. Tech. Publications, Zurich.

Tatlock, G.J. and Evans, H.E. (eds), (2005). **Microscopy of Oxidation 6**. Science Reviews, St. Albans, UK

Saunders, S.R.J., Evans, H.E. and Stringer, J. (eds), (1996), **Mechanical Properties of Protective Oxide Scales. Butterworth-Heinemann, London, 1996.** Butterworth-Heinemann, London, 1996.

Evans, H.E., (1995). "Stress Effects in High Temperature Oxidation of Metals", **International Materials Reviews**, 40, 1-40.

Evans, H.E., (1984), **Mechanisms of Creep Fracture**, Elsevier Applied Science Publishers, London