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Professor of Surface Engineering

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About

Hanshan Dong is Professor of Surface Engineering and Leader of Surface Engineering Research Group at the University of Birmingham.

He is a leading surface engineering expert in developing novel surface engineering technologies (such as S-phase surface engineering, ceramic conversion, active-screen plasma), surface engineering design and modelling, and characterisation of surface engineered materials (such as environmental nanoindentation).

Hanshan has published more than 200 papers in international journals and conferences together with 4 patents, 1 book and 4 book chapters. During the past 10 years, he has successfully been awarded for 20 research projects and received major grants from EC, EPSRC, TSB and the Royal Society. He won the Harvey Flower Titanium Prize 2004 awarded by IoM^3 'in recognition of his contribution to the science and technology of surface engineering of titanium alloys'.

He is active in international surface engineering activities including visiting professorships, plenary and invited lectures to major international conferences, organisation of national and international conferences and is on the editorial board of academic journals.

Qualifications

Fellow of IoM3 & Chartered Engineer, 2001

PhD in Metallurgy & Materials (Surface Engineering), Birmingham University, 1997

MSc in Tribology, Dong-Hua University, China, 1986

BSc in Materials Science and Engineering, Shanghai University, China, 1983

Biography

Hanshan Dong received his BSc degree in Materials Science and Engineering from Shanghai University, China in 1983 and his MPhil degree in Tribology from Dong-Hua University, Shanghai, China in 1986.

Prior to commencing his PhD studies in Surface Engineering at the University of Birmingham in 1992, he had been a lecturer and then senior lecturer at the prestigious Dong-Hua University, Shanghai, China for 6 years.

Following 8 years of PhD studies and postdoctoral research at the University of Birmingham, he became a Lecturer in 2000 and was promoted to Senior Lecturer in 2005, Reader in 2007 and Professor in 2010

Teaching

Undergraduate Programmes:

- Biomaterials
- Materials for Sports Equipment
- Advanced Materials
- Case Studies – Metallic Materials for Body Implants

Postgraduate Programme:

- Surface Engineering

Postgraduate supervision

Current Postgraduate Students & Projects

- Mr. Tom Bell (EngD), 'Surface modification and characterisation of metallic biomaterials'
- Mr. Gerard Bell (EngD), 'Cryogenic nano mechanical and tribological properties of surface engineered materials'
- Mr. David Mills (EngD), 'Localised processing during repair: characterisation and removal of alpha-case'
- Miss Yangchun Dong (PhD), 'Towards novel anti-microbial multifunctional stainless steel surfaces: active-screen plasma surface alloying with C, N, Ag and Cu'
- Miss Georgia Kaklamani (PhD), 'Active-screen plasma surface modification and biocompatibility of polymeric and ceramic biomaterials'

- Mr. Wei Li (PhD), ‘Effect of stress on the formation and stability of S-phase in 316 austenitic stainless steel’
- Ms Xin Fu (PhD), ‘Plasma surface modification and characterisation of biopolymers’
- Miss Ran JI (PhD), ‘Development and characterisation of nano-multilayer coating system for cutting tools’
- Miss Xia Luo (PhD), ‘Development of long-life Co-Cr joint prostheses by plasma surface alloying and duplex treatments’
- Mr. Tom Plumer (MRes), ‘Towards multi-functional zirconium surfaces by novel ceramic conversion treatments’
- Miss Louis Cook (MRes), ‘Low-temperature active-screen plasma surface alloying of martensitic and precipitation hardening stainless steels’

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Research

RESEARCH THEMES

Advanced Surface Engineering Technologies:

Ceramic conversion of Ti- & Zr-based alloys

S-phase treatment of Fe-Cr, Co-Cr & Ni-Cr alloys

Active-screen plasma co-alloying

Oxygen diffusion deep-case hardening of Ti alloys

Plasma technologies (PI^3, active screen plasma)

Nano- composite coatings

Multi-functional surfaces

Micro- & nano- surface patterning

Surface Engineering Design, Modelling & Simulation:

Duplex and multilayer surface system design,

Multi-scale modelling of multi-layered surfaces

Simulation of surface engineering processes

Characterisation & Evaluation of Engineered Surfaces:

XRD, GDOES, XPS, TEM, FIB/SEM

Environmental nano-indentation

Rolling/sliding/fretting wear testing

Corrosion, oxidation & corrosion-wear

FUNDED RESEARCH PROJECTS

- Multiscale modelling of multilayered surface systems (EU)
- Anti-microbial multifunctional stainless steel surfaces: active-screen plasma surface alloying with C, N, Ag and Cu (EPSRC)
- The cryogenic nano mechanical and tribological properties of surface engineered materials (EPSRC)
- New tools/methods for ‘real time’ protein structure, bioprocess intensification and cell separation (BBSRC)
- MinSE: European master’s in heat treatment and surface engineering (EU)
- Materials technologies for remanufacturing automotive and engine components (TSB)
- Nanofretting of surface engineered and bulk materials for MEMS/NEMS (Royal Soc & NSFC)
- Towards long-life remanufacturing heavy-duty gears: technologies and mechanisms (Royal Soc & NSFC)

Other activities

- Member, Surface Engineering Committee, IoM^3
- Member, EPSRC Peer Review College, UK
- Deputy Editor, *China Surface Engineering*
- Member, Editorial Board of International Journals: *"Surface Engineering" and "International Journal of Surface Science & Engineering"*
- International adviser, editorial committee of Journal *"Materials Protection' '(in Chinese)*

Publications

I. Patents

Morton P.H., Bloyce A. and Dong H.: ‘*Titanium alloy product and methods for their production* ', US Patent 5792289 / European Patent EP0722510 (11 August 1998).

Dong H., Bloyce A., Morton P. M. and Bell T.: *'Methods of case hardening of titanium alloys'*, European Patent EP1000180 (17 November 2001).

Dong H., Bloyce A., Morton P. M. and Bell T.: *'Surface oxidation of a titanium or titanium alloy article*', US Patent 6210807 (3 April 2001).

Bell T., Dong H. and Li C. X.: *'Plasma surface treatment of Co-Cr biomaterial'*, European Patent EP 1 499 755B1 (21 May 2008).

II. Edited Works

Book:

Dong H. (ed.), (2010) Surface Engineering of Light Alloys – Aluminium, Magnesium and Titanium Alloys, Woodhead Publishing Ltd, Cambridge

Special issue of journal:

Dong H. (guest ed.) (2010),: Surface Engineering, 26 (1-2), , Special Issue **Maney Publishing (http://www.maney.co.uk/index.php/journals/sur/)**

III Book chapters

Dong H. (2003), *Ch. 7: Surface Engineering in Sport*, in Jenkins M. (ed.) Materials in Sports Equipment, Woodhead Publishing Ltd, , pp 160-195

Dong H. (2005), *Ch 9*: *Thermochemical Surface Engineering*, in Xu B. S. and Liu S. C. (eds.) Chinese Material Engineering Canon: Vol.16 Surface Engineering, Chemical Industry Press, Beijing, 2006, pp601-660

Dong H. (2010), *Ch. 3, Tribological properties of titanium alloys*, in Dong H. (ed.): Surface Engineering of Light Alloys – Aluminium, Magnesium and Titanium Alloys, Woodhead Publishing Ltd, Cambridge, pp58-80

Li X. and Dong H. (2010), *Ch. 14: Ceramic conversion of titanium-based materials*, in Dong H. (ed.): Surface Engineering of Light Alloys – Aluminium, Magnesium and Titanium Alloys, Woodhead Publishing Ltd, Cambridge, pp475-500

IV. Academic Journal Papers (since 2009)

Ruset C., Grigore E., Li X., Dong H.: 'Synthesis and characterization of W reinforced carbon coatings produced by combined magnetron sputtering and ion implantation technique', ***Thin Solid Films***, Available online 9 Feb 2011 (doi: 10.1016/j.tsf.2011.01.376).

Dong Y., Li X., Tian L., Bell T., Sammons R.L., Dong H. (2011): 'Towards long-lasting antibacterial stainless steel surfaces by combining double glow plasma silvering with active screen plasma nitriding', **Acta Biomaterialia,** 7(1), 447-457

Li X., Wu W., and Dong H. (2011): 'Microstructural characterisation of carbon doped CrAlTiN coatings', ***Surface and Coatings Technology*****,** 205(10), 3251-3259

Corujeira Gallo S. and Dong H. (2011): Corrosion behaviour of DC and AS plasma carburised 316 ASS in boiling H_2SO_4 solutions, ***Corrosion Engineering, Science and Technology***, 46, 8-16

Chen J., Bell G., Beake B. and Dong H. (2010): 'Nano-mechanical & tribological properties of a-C:H/TiCN/TiN coating under sub-ambient temperatures', ***International Journal of Engineering Systems Modelling and Simulation,***2, 199-203

Dong H. (2010): 'Guest editorial: in memory of Tom Bell', ***Surface Engineering,*** **26**, 1-10.

Li X. Y., Buhagiar J. and Dong H. (2010), 'Characterisation of dual S phase layer on plasma carbonitrided biomedical austenitic stainless steels', ***Surface Engineering***, **26**, 67-73.

Ji R., Li X. and Dong H. (2010), 'Ceramic conversion treatment of Zr702 and Zr705 to combat wear', ***Surface Engineering***, **26**, 30-36.

Dong H. (2010): 'S-phase surface engineering of Fe-Cr, Co-Cr and Ni-Cr alloys', ***International Materials Review***, **55**, 65–98

Grigore E., Ruset Li C., X., Dong H. (2010): 'Zirconium carbonitride films deposited by combined magnetron sputtering and ion implantation (CMSII)', ***Surface and Coatings Technology***, 204, 1889- 1892

Grigore E., Ruset C., Li X., Dong H. (2010): 'The influence of carbon content on the characteristics of V-C-N coatings deposited by combined magnetron sputtering and ion implantation (CMSII), ***Surface and Coatings Technology***, 204, 2006-2009

Dong Y.C., Li X., Simon R. and Dong H. (2010), 'The generation of wear-resistant antimicrobial stainless steel surfaces by active screen plasma alloying with N and nanocrystalline Ag', ***Journal of Biomedical Materials Research Part B***, 93B, 185-193

Yu B, Qian L., Zhou Z., Yu J, Dong H. and Zhou Z. (2010), 'Friction-induced hillocks on monocrystalline silicon in atmosphere and in vacuum, ***Wear***,268, 1095-1102

Grigore E., Ruset C., Li X. and Dong H. (2010): 'Synthesis and characterization of (C, N)-alloyed stainless steel coatings by high energy ion assisted magnetron sputtering deposition', ***Materials and Manufacturing Processes***, 25, 341-344.

Chen J., Li X. and Dong H. (2010), 'Formation and characterisations of S-Phase in plasma carburised high-carbon Stellite 21 CoCr alloy', ***Surface Engineering***, 26, 233-241

Buhagiar J., Dong H. (2010), Low temperature plasma carbonitriding of ASTM F138 and ASTM F1586 biomedical stainless steels, ***Surface Engineering***, 26, 256-264

Buhagiar J., Qian L. and Dong H. (2010),:'Surface property enhancement of Ni-free medical grade austenitic stainless steel by low-temperature plasma carburising',***Surface and Coatings Technology*****,** 205, 388-395.

Dong Y., Li X., Bell T., Sammons R. and Dong H. (2010): 'Surface microstructure and antibacterial property of active-screen plasma alloyed austenitic stainless steel surface with Cu and N', ***Biomedical Materials***, 5054105 (8pp)

Kaklamani G., Mehrban N., Chen J., Bowen J., Dong H., Grover L. and Stamboulis A. (2010): 'Effect of plasma surface modification on the biocompatibility of UHMWPE', ***Biomedical Materials***, **5** 054102 (10pp)

Chen J., Bell G. A., Dong H., Smith J. F. and Beake B. D. (2010): A study of low temperature mechanical properties and creep behaviour of polypropylene using a new sub-ambient temperature nanoindentation test platform', ***J Appl Physics D Applied Physics***, **43** 425404(9pp)

Khan R.H.U., Yerokhin A.L., Li X., Dong H. and Matthews A. (2010): 'Microstructural and residual stress characterisation of DC PEO treated Al6082 alloy', ***Surface and Coatings Technology***, 205, 1679-1688

Chen J., G. Bell, Beake B. and Dong H. (2010): 'Nano-mechanical & tribological properties of a-C:H/TiCN/TiN coating under sub-ambient temperatures', ***International Journal of Engineering Systems Modelling and Simulation,***4, 199-203.

Xu B-S, Zhang X-D, Dong S-Y, Dong H., Wang Z-J and Yan S-X (2010):'Study on the wear resistance of duplex treated surface layers by laser cladding and active-screen plasma nitriding', ***Materials Engineering*** (in Chinese), No.2, 37-41.

Yu B., Dong H., Qian L., Chen Y., Yu J., Zhou Z. (2009), 'Friction-induced nanofabrication on monocrystalline silicon', ***Nanotechnology***, **20**, 465303(8pp)

Buhagiar J., Li X. and Dong H. (2009), 'Formation and microstructural characterisation of S-phase layer in Ni-Free austenitic stainless steels by low temperature plasma surface alloying', ***Surface and Coatings Technology***, **204**, 330-345.

Corujeira Gallo S. and Dong H. (2009): 'On the fundamental mechanisms of active screen plasma nitriding', ***Vacuum*****, 84**, 321-325.

Corujeira Gallo S. and Dong H. (2009), 'Study of active screen plasma processing conditions for carburising and nitriding austenitic stainless steel', ***Surface and Coatings Technology***, 2003, 1273-1280.

Chen J and Dong H. (2009), Corrosion and corrosion wear behaviour of plasma carburised Stellite 21 Co-Cr alloy, ***Tribology – Materials, Surfaces & Interfaces***, **3**, 24-30.

Miguélez-Morán A.M., Wu C.-Y., Dong H., Seville J.P.K. (2009): Characterisation of density distributions in roller compacted ribbons using micro-indentation and X-ray micro-computed tomography, ***European Journal of Pharmaceutics and Biopharmaceutics*****, 72,** 173–182.

Wu W., Li X., Chen J., Dong H. (2009): 'Design and characterisation of an advanced duplex system based on S-phase case and GiC coatings for 316LVM austenitic stainless steel', ***Surface and Coatings Technology***, **103**, 1273-1280.

Liu J., Qian L., Dong H. and Buhagiar J. (2009), 'Effect of surface treatment on the fretting wear behaviour of medical grade austenitic stainless steels', ***Chinese Journal of Tribology***, 29, 163-167Grigore E, Ruset C, Li X and Dong H (2009): Comparison of Magnetron Deposited N-Alloyed Stainless Steel Coatings and Low Temperature Plasma Nitrided Austenitic Stainless Steel, ***Plasma Processes & Polymer***, **6**, S321-S325.

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