Professor Moataz Attallah Bsc, MSc, PhD, MWeldI, AHEA

Professor of Advanced Materials Processing

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

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About

Professor Moataz Attallah holds a chair in advanced materials processing. He received his PhD in metallurgy and materials science from the University of Birmingham (2007), BSc (highest honours) and MSc degrees from the American University in Cairo (AUC) Egypt, in mechanical engineering, and materials/manufacturing engineering respectively.

Following his PhD, Moataz worked as a research fellow at the University of Manchester Materials Science Centre from January 2007, prior to his appointment as a lecturer at the School of Metallurgy and Materials at the University of Birmingham in June 2010.

His research portfolio over the past 14 years has been focused on studying the phase transformations, microstructure-property and structural integrity development in friction-based welding technologies, netshape powder hot isostatic pressing, and additive laser fabrication technologies (blown powder and laser powder bed) in aluminium, titanium, ferrous, and nickel-base superalloys, through research partnerships with Rolls-Royce plc, MBDA, European Space Agency (ESA), ITP, Aero Engine Controls, BAE Systems, TWI, Messier-Bugatti Dowty, MicroTurbo, Meggitt, and Novelis technology.

He co-authored over 40 journal and conference papers, 1 book chapter, and several industrial reports. His current grant portfolio as a PI includes 4 FP7, 1 TSB/KTP and 3 industrial projects, in addition to being a Co-I on other projects funded by EPSRC, Dstl, and ERDF. In total, Moataz has been involved in projects in excess of £10 M. Moataz also serves as the academic leader for netshape manufacturing theme at the Manufacturing Technology Centre (MTC).

Podcast: **3D printing – the future of construction? – Dr Moataz Attallah (https://audioboo.fm/boos/2439390-3d-printing-the-future-of-construction-dr-moataz-attallah)**

Qualifications

- PhD (Metallurgy & Materials Science), University of Birmingham, 2007 (Degree conferred 2008)
- MSc (Materials & Manufacturing), The American University in Cairo, 2003
- BSc Hons (Mechanical Engineering), The American University in Cairo (Egypt), 2001.

Biography

Moataz Attallah received his BSc (highest honours) and MSc in mechanical and materials/manufacturing engineering, 2001 and 2003 respectively, from the American University in Cairo, Egypt. He went on to study for a PhD in Metallurgy and Materials Science from the University of Birmingham between 2003 and 2007. He then worked as a research fellow between January 2007 and June 2010 at the, University of Manchester's School of Materials. In Manchester, Moataz was a member of the Stress & Damage Characterisation Unit (led by Professors Phil Withers and Michael Preuss), which is the largest research group in Europe with a research portfolio focused on neutron and synchrotron x-ray diffraction. During that period, Moataz had a brief spell at Osaka University in Japan, where he worked on in-situ confocal microscopy in Prof. Komizo's laboratory.

From June 2010, he returned to the University of Birmingham as a lecturer in advanced materials processing. He was appointed to a chair in advanced materials processing in August 2014. He leads the **Advanced Materials and Processing Lab (AMPLab) (/research/activity/irc-materials-processing/themes/AMPLab/index.aspx) (http://www.birmingham.ac.uk/amplab)**

Moataz is a member of the Welding Institute (MWeldI), and also a member of the Global Young Academy (**http://www.globalyoungacademy.org/ (http://www.globalyoungacademy.org/)**), which is an international organisation for young academics.

Moataz is also the academic theme leader for near net shape manufacturing theme for the Catapult's Manufacturing Technology Centre (MTC). MTC provides an environment in which world-class providers of research and development in key manufacturing technologies work alongside high-value manufacturing industries in transferring and exchanging knowledge focussed on delivering user-driven advanced manufacturing solutions.

Teaching

EngD modules:

- Physical Metallurgy in Titanium and Nickel (with Prof. John Knott)
- Netshape Manufacturing
- Materials for Manufacturing (with Prof. Paul Bowen)
- Materials characterisation

Undergraduate modules:

- Fundamentals of Materials-Shaping (1FoM-b)

- Contributions to 1DPs, 3AMP, and other modules.

Postgraduate supervision

PhD Students:

- Sarah Baker: Friction Stir Welding of Ti-Alloys (with Prof. P. Bowen)
- Yang Jian: Linear Friction Welding of Superalloys (with Prof. P. Bowen and Dr. Y.L. Chu)
- Wei Wang: Microstructural Development n Laser Powder Bed Processing of Al-Alloys
- James Macdonald: Hot Isostatic Pressing of Nickel Superalloys for High Temperature Applications
- Shichao Liu: Structure-Property Relations in Ti-alloys Prepared Using Combinatorial Synthesis
- Xiqian Wang: Laser Powder Bed Processing of Nickel Superalloys
- Sheng Li: Combinatorial Synthesis of Shape Memory Alloys

EngD Students:

- Phil McNutt: High Productivity Laser Deposition
- Jan White: Selective Laser Melting of Al-Alloys for Engine Controller Parts
- Riccardo Tosi: Additive Manufacturing factory of the future
- Richard Ashwell: High-Integrity Components through Advanced Rotary Friction Welding

Research

RESEARCH THEMES

1. Laser Net Shape Fabrication (using blown powder and powder laser bed).
2. Solid-Solid and Liquid-Solid Phase Transformations due to Friction-based Welding (linear friction, inertia, and friction stir) and laser fabrication (blown powder and laser bed) of Ti, Al, Ni, and ferrous alloys.
3. Residual Stress, Micromechanics, and phase transformations Characterisation using Neutron and Synchrotron X-ray Diffraction.
4. Phase Transformations in Ti-Alloys and Ni-superalloys.
5. In-Situ Observation of the Phase Transformations in Metallic Materials using High Temperature Confocal Laser Scanning Microscopy.
6. Comparative Quantitative Microstructural Characterisation using electron microscopy and x-ray diffraction for structure-property modelling.
7. Severe Plastic Deformation in Al-Alloys: the consolidation behaviour of nanocrystalline powders, in combination with subsequent equal channel angular processing.
8. Plastic Deformation and Recrystallisation in Al-alloys.

RESEARCH ACTIVITY

1. Mitigation of Cracking due to Laser Bed Fabrication of Nickel-base superalloys.
2. Microstructural Characteristics of Direct Laser Fabrication (DLF) products in Al, Ni, and Ti alloys.
3. Linear Friction Welding of Titanium and Nickel Superalloys: Microstructural and Residual Stress Development.
4. Netshape Powder HIPping of Nickerl Superalloys.
5. Laser Powder Bed Fabrication of Metallic Materials.
6. Combinatorial Synthesis of Titanium-based Alloys

Other activities

Moataz is a member of the Welding Institute (MWeldI). He is also a member of the **Global Young Academy (http://www.globalyoungacademy.org/)** , which is an international organisation for young academics. Its primary aim is to unlock the potential of young scientists from around the world; working together, this group can provide new insights on major challenges in scientific capacity-building and science-based education, policy and international issues.

Publications

Selected publications

- LL Parimi, Ravi GA, D Clark, **MM Attallah**: *Microstructural and Texture Development in Direct Laser Fabricated IN718*. Materials Characterization, 2014, vol. 89, pp. 102-11.
- CJ Bennett, **MM Attallah**, M Preuss, PH Shipway, TH Hyde, S Bray: *Finite element modelling of the inertia friction welding of dissimilar high strength steels*. Metallurgical and Materials Transactions A, 2013, vol. 44 (11), pp. 5054-5064.
- CL Qiu, N. J. Adkins, and **MM Attallah:** , *Microstructure and Tensile Properties of Selectively Laser-Melted and HIPed Laser-Melted Ti-6Al-4V*, Materials Science and Engineering A, 2013, vol. 578, pp. 230-239.
- T Haenschke, CL Davis, **MM Attallah**: *Influence of the Microstructural Inhomogeneities on the Martensite to Austenite Phase Transformation Temperatures in TiNiCu-based Shape Memory Alloys*. Materials Chemistry and Physics, 2013, vol. 141, no. 1, pp. 272-277.
- CL Qiu, **MM Attallah**, XH Wu, P Andrews: *Influence of Hot Isostatic Pressing Temperature on Microstructure and Tensile Properties of a Nickel-based Superalloy Powder*. Materials Science and Engineering A, 2013, vol. 564, pp. 176–185.
- GA Ravi, XJ Hao, N Wain, XH Wu, **MM Attallah**: *Direct Laser Fabrication of Three Dimensional Components using SC420 Stainless Steel*. Materials & Design, 2013, vol. 47, pp. 731-736.
- **MM Attallah**, M Preuss, C Booncharoen, A Steuwer, JE Daniels, DJ Hughes, C Dungey, GJ Baxter: *Microstructural and Residual Stress Development due to Inertia Friction Welding of Ti-6246*. Metallurgical and Materials Transactions A, 2012, vol. 43, no. 9, pp. 3149-3161.

Expertise

Metallic materials used in aerospace; characterising their properties and manufacturing processes, especially friction welding and laser powder fabrication

Alternative contact number available for this expert: **contact the press office (http://www.birmingham.ac.uk/news/contacts/index.aspx)**