



NAME : ADVANCED MATERIALS RESEARCH INSTITUTE

INSTITUTION : NORTHUMBRIA UNIVERSITY

COUNTRY : GREAT BRITAIN

Profile :

The *Advanced Materials Research Institute (AMRI)*, was officially launched in June 2000, incorporating what was the *Surface Engineering Research Group (SERG)* that was established in 1986. As well as its own staff it draws on colleagues within the School of Computing, Engineering and Information Sciences.

Early funding was from British Gas, MOD and the European Joint Research Centre at Petten and was strengthened by a jointly awarded EPSRC Rolling Grant and CEC BRITE/EuRAM grant. Further funding from EPSRC, NPL, Rolls Royce, DTI Link Scheme and the CEC increased its research base and research portfolios. When AMRI was formed, substantial EU regional development funds were used to improve and augment the research infrastructure and add the role of technology transfer and industrial support in the fields of processes and heat treatment, corrosion engineering and design, and electron beam technology .to our remit. More recently such funding has enabled our equipment base to have been increased with acquisition of several nano-characterisation instruments including ESEMwith EDX and WDX, ambient and UHV AFM/multi-mode STMs, and XPS with *in-situ* reaction capability. Our latest equipment is a multi-target closed-field unbalanced magnetron sputtering system.

A significant part of the research work falls within the areas of *coatings and advanced materials* focussing on such fields as surface/bulk properties and the design and development of alloys and coatings to resist high temperature (HT) degradation in oxygen and in complex sulphur- and chlorine- containing environments, and to improve fatigue and wear resistance. Work in this area has significantly enhanced an understanding of the nucleation and growth processes involved in the development of deposited coatings and coatings developed by thermal and environmental methods. Based on such knowledge the *Institute* has used PVD, CVD, pack-cementation and electroless deposition technologies to successfully develop coatings and surfaces to solve a wide range of complex industrial problems. The research focus has been strengthened by strategic collaboration with partners in the UK, Europe, USA and Japan including major roles in Framework 5 and Framework 6 projects

Activities :

- **Research – Advanced Materials, Nanotechnology, Surface Engineering, Surface Analysis, Aqueous and High Temperature Corrosion**
- **Outreach – Short and Long Term Consultancy**
- **Teaching – Undergraduate and Postgraduate modules in Advanced Materials, Nanotechnology, Surface Engineering, Surface Analysis, Aqueous and High Temperature Corrosion.**
- **Research degrees in Advanced Materials, Nanotechnology, Surface Engineering, Surface Analysis, Aqueous and High Temperature Corrosion**
- **Professional Bodies – Management and trustee positions with Institute of Corrosion, The Science Council: professional citizenship – regional branch of Institute of Physics, committee membership, Institute of Materials, Minerals and Mining**



Expertise on following materials : <ul style="list-style-type: none">- Superalloys – Nickel-based- Intermetallics – Nickel and Titanium based- High temperature advanced ceramics eg Silicon Nitride and Carbide- Composites – intermetallic matrix- Coatings materials- feralloys, chromia, alumina and silica, range of PVD coatings- Single wall carbon nanotubes	
Actual research domains concerning materials technology / Competences : <ul style="list-style-type: none">- Nanotechnology- deposition and metrology- Surface engineering – deposition and characterization and modeling- Advanced materials – design for wear and corrosion resistance	
Available research infrastructure : <ul style="list-style-type: none">- PVD- Sputtering and E-Beam ion plating- Pack cementation- SEM inc ESEM, EDX, WDX, hot stage- UHV and ambient AFM/STM- Nanoindenter- XPS with additional modes inc. in-situ reaction chamber and depth profiling- XRD- High temperature oxidation, sulphidation and hot corrosion facilities	
Coordinate address :	AMRI, Northumbria University, Ellison Building, Ellison Place Newcastle upon Tyne NE1 8ST UK
URL	http://amri.unn.ac.uk
Contact persons :	
Name :	Professor S. Datta
Function :	Director of AMRI
Tel. :	+44 (0) 191 227 4973
Fax :	+44 (0) 191 227 3598
e-mail :	Psantu.datta@unn.ac.uk