

Research  
Opportunity  
Advanced Aerospace  
Materials

Old Court, Peterhouse



First Class BA in Natural Sciences (2001)

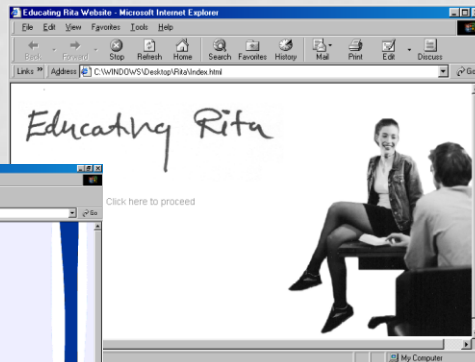
MSci in Materials Science and Metallurgy

Five summer placements with BAE SYSTEMS



1st VIII Rowing

College Website Design

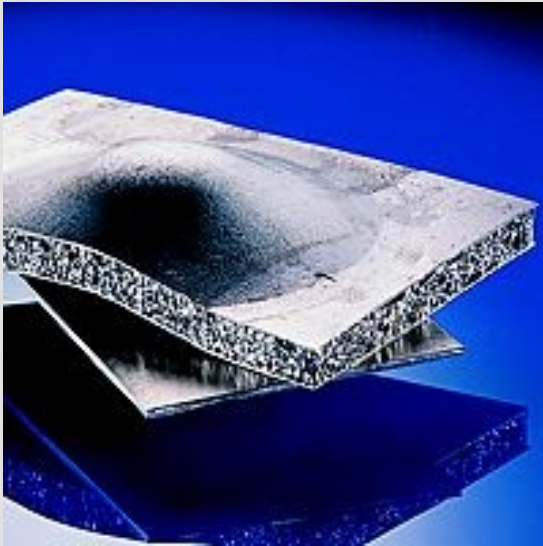


Communications Officer

College JCR Vice-President



# Composites and Coatings Group – Prof. T.W. Clyne

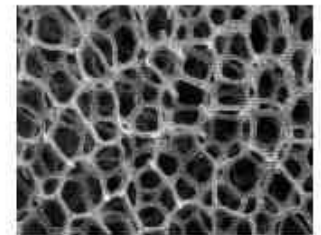
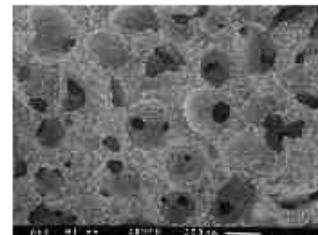
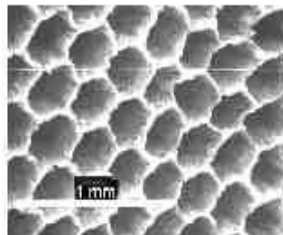
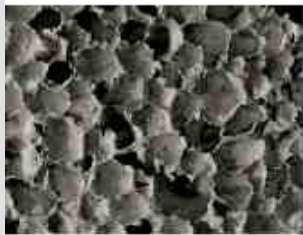


**Sandwich Panel**  
(NPL Website)

## Metallic Foams:

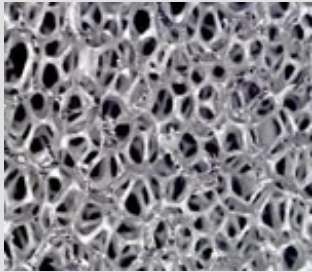
Aluminium foams  
Titanium foams

*Cross section of a foam strut about 50  $\mu\text{m}$  wide*



**Different classes of metal foam produced via different processing routes** (Metalfoam.net)

# Processes

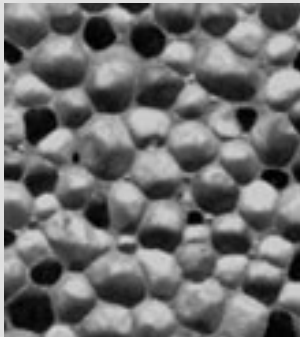
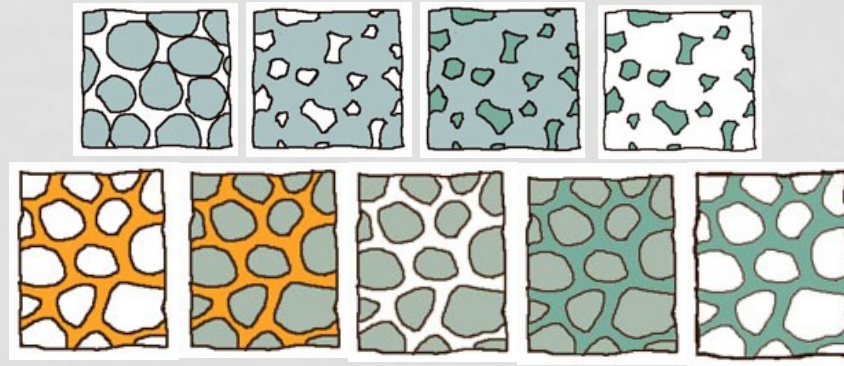


## Open celled foam produced by INFILTRATION

Salt moulds, plaster moulds using another foam, electrodeposition

Control, moulding, alloys

Expensive, discontinuous, slow



## Closed cell foam produced by GAS EVOLUTION

Cymat (Alcan) process: froth flotation

Continuous, cheap

6 cm slabs, inhomogeneous, viscosity limits

Alporas process: TiH

Finer pores, uniform distribution

More expensive, limited shape

FORMGRIP process; precursor, moulded

Control, moulding, alloys

Expensive, discontinuous, slow

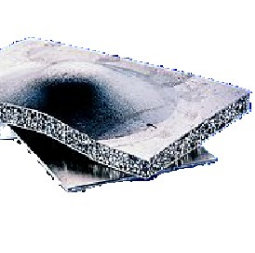


# Applications

**Properties:** High strength, low density, high mpt., energy absorption



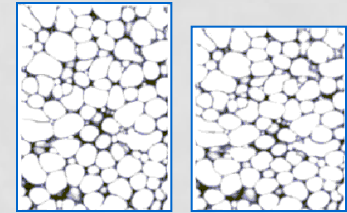
## Structural material



Bending; high moment of inertia = very high specific strength, stiffness  
High flexural rigidity against similar solid masses  
Isotropic = shear resistance  
Sandwich panels, filled pipes, beams

## Impact absorber

Plastic deformation in walls at low, constant stress; isotropic

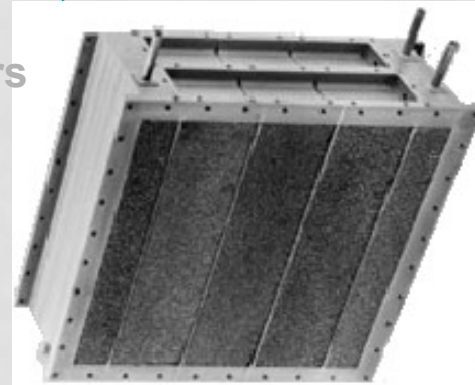


5% compression

## Acoustic absorber

Open celled structures, large surface area; closed cell structures

Corrosion resistant, high temperature filters  
Heat exchangers  
Fire protection  
Electrodes  
Catalyst supports



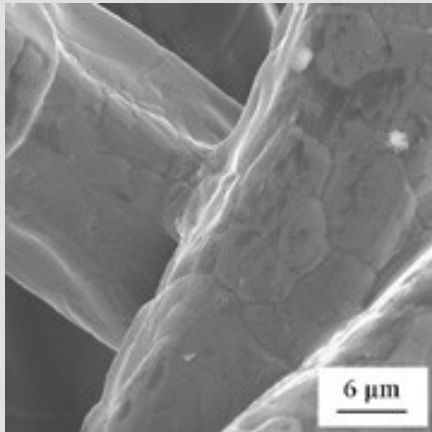
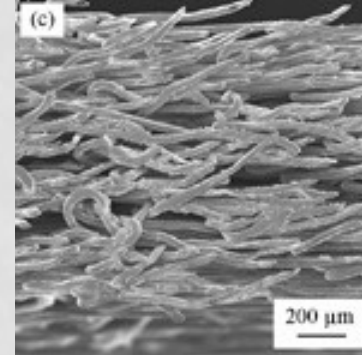
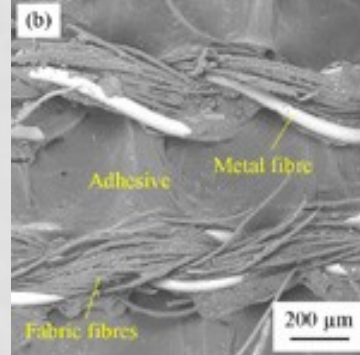
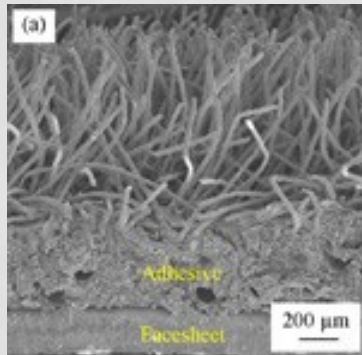


## Other fields

### Novel metallic multi-layer composite sheet materials

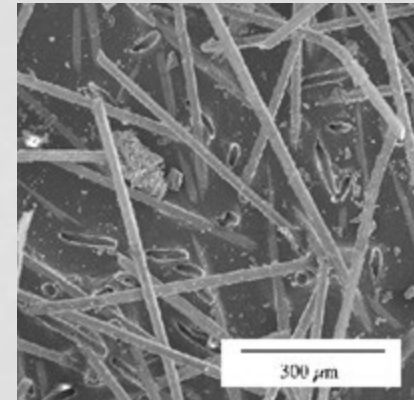


Good handling, high specific stiffness, acoustic damping, thermal insulation



Sintering

Fibre pull-out



## Timescale

**September 2001 - Current placement ends**

**October 2001 – Enquiries in Cambridge and communication with Samlesbury**

**December 2001 – Make decision on research group**

**January 2002 – Apply to research group (with proposal from BAE SYSTEMS?)**

**Lent and Easter terms – Complete MSci course**

**Lent and Easter terms – Finalise PhD plan**

**Summer 2002 – Placement with BAE SYSTEMS?**

**October 2002 – Begin PhD**

**... Research**

**September 2005 – Finish PhD**

Jan 02

Jan 03

Jan 04

Jan 05

Jan 06

