<table>
<thead>
<tr>
<th>KEY TRENDS &amp; DRIVERS</th>
<th>ENERGY</th>
<th>ENVIRONMENT / RESOURCES</th>
<th>SOCIAL / POLITICAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>efficient use, cost/life cycle</td>
<td>climate change, clean air/water</td>
<td>efficient use, cost/life cycle</td>
<td>defence, personal/ national security</td>
</tr>
<tr>
<td>availability/security of supply</td>
<td>waste, recycling</td>
<td>UK competitiveness</td>
<td></td>
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</tbody>
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**PRIORITY APPLICATION AREAS**

- **MATERIALS AND COATINGS FOR SEVERE ENVIRONMENTS**
  - gas turbines; nuclear, ultra high temp
- **LOW EMISSION VEHICLES**
  - filters; batteries; fuel cells; catalytic converters; H storage; sensors
- **NEW / LOCAL POWER GENERATION SYSTEMS**
  - sources; fuel cells; membranes
- **ENERGY EFFICIENCY/REUSE/RECYCLING/REPAIR**
  - near-net, low-energy & aqueous processing
- **ARMOUR**
  - personal security; intelligent armour; stealth

### PROCESSING

- Cheaper fibres and cheaper processes
  - Thicker/thinner/multilayer functional coatings
- New materials with higher temp. capability
  - Improved thermal shock resistant foams
  - Improved durability; reliability
- Failure and degradation mechanisms, including ultra high temperature
  - Non-destructive evaluation
  - Piezo-behaviour in sensors
  - Gas sensing performance
- Dissimilar material
  - - co-sintering
  - - mechanical fixation
- Lifting
  - Design methodologies
- High temp micro-reactors
  - Self-cleaning, smart filters

### MICRO-STRUCTURE

- Controlled porosity
  - Infiltration of foams
- Improved thermal shock resistant foams
  - Improved durability; reliability
- Non-destructive evaluation
  - Piezo-behaviour in sensors
  - Gas sensing performance
- Dissimilar materials
- Dissimilar materials-consistency and interdiffusion
- Design methodologies
- Standards/validation

### CHARACTERISATION / TESTING

- Co-sintering of dense and porous materials; metals and ceramics
- Improved durability; reliability
- Non-destructive evaluation
- Joints that can be 'unjoined' at end of life
- Chemical recovery
- Modelling of shaping processes

### JOINING & INTEGRATION

- Near net shaping
  - Aqueous processing
  - Novel chemistry
- Design for repair and/or recycling
- Simple 'lab' tests to predict ballistic behaviour
- Joining to backing plate

### MODELLING

- Defect free Fracture mechanisms bond design
  - Affordable processing
- Transparent; lighter
  - More damage tolerant; tougher?
  - Nanomaterials? Transformative materials?
- Joining to backing plate

### OTHER

- Affordable processing
- Thicker/thinner/multilayer functional coatings
- Improved thermal shock resistant foams
- Improved durability; reliability
- Non-destructive evaluation
- Simple 'lab' tests to predict ballistic behaviour
- Modelling of shaping processes
- Modelling of ballistic impact
- Input data for models

**CROSS-CUTTING THEMES**

- cross-sector collaboration; UK supply chain; pilot scale facilities; educated personnel