Historically, the discovery, development and application of metals have set the pace for the evolution of human civilisation, driven the way that people live, and shaped our modern societies. Today, metals are the backbone of the global manufacturing industry and the fuel for economic growth. In the UK, the metals industry comprises 11,100 companies, employs 230,000 people, directly contributes £10.7bn to the UK GDP, and indirectly supports a further 750,000 employees and underpins some £200bn of UK GDP.

As a foundation industry, it underpins the competitive position of every industrial sector, including aerospace, automotive, construction, electronics, defence and general engineering. However, extraction and processing of metals are very energy intensive and cause severe environmental damage: the extraction of seven major metals (Fe, Al, Cu, Pb, Mn, Ni and Zn) accounts for 15% of the global primary energy demand and 12% of the global GHG emission. In addition, metals can in theory be recycled infinitely without degradation, saving enormous amounts of energy and CO2 emission. For instance, compared with the extraction route, recycling of steel saves 85% of energy, 86% GHG emission, 40% water consumption and 76% water pollution. Moreover, metals are closely associated with resource scarcity and supply security, and this is particularly true for the UK, which relies almost 100% on the import of metals.

The grand challenge facing the entire world is decoupling economic growth from environmental damage, in which metals have a critical role to play. Our vision is full metal circulation, which will make the best use of the metals that we already have. Full metal circulation means no more mining, no more metal extraction, and no more primary metals. We importantly will change completely the way we use natural resources. Full metal circulation represents a paradigm shift for metallurgical science, manufacturing technology and the industrial landscape, and more importantly will change completely the way we use tural resources. Full metal circulation means no more mining, no more metal extraction, and no more primary metals. We will make the best use of the metals that we already have.

We propose to establish an Interdisciplinary Circular Economy Centre, CircularMetal, to accelerate the transition from the current largely take-make-waste linear economy to full metal circulation. Our ambition is to make the UK the first country to realise full metal circulation (at least for the high-volume metals) by 2050. This will form an integral part of the government’s efforts to double resource productivity and realise Net Zero by 2050. We have assembled a truly interdisciplinary academic team with a wide range of academic expertise, and a strong industrial consortium involving the full metals supply chain with a high level of financial support. We will conduct macro-economic analysis of metal flow to identify circularity gaps in the metals industry and to develop pathways, policies and regulations to bridge them; we will develop circular product design principles, circular business models and circular supply chain strategies to facilitate the transition to full metal circulation; we will develop circular alloys and circular manufacturing technologies to enable the transition to full metal circulation; and we will engage actively with the wider academic and industrial communities, policy makers and the general public to deliver the widest possible impact of full metal circulation. The CircularMetal centre will provide the capability and pathways to eliminate the need for metal extraction, and the estimated accumulative economic contribution to the UK could be over £100bn in the next 10 years.

Key Findings
This information can now be found on Gateway to Research (GtR) http://gtr.rcuk.ac.uk

Potential use in non-academic contexts
This information can now be found on Gateway to Research (GtR) http://gtr.rcuk.ac.uk

Impacts
This information can now be found on Gateway to Research (GtR) http://gtr.rcuk.ac.uk

Summary
This information can now be found on Gateway to Research (GtR) http://gtr.rcuk.ac.uk

Materialised
This information can now be found on Gateway to Research (GtR) http://gtr.rcuk.ac.uk

Sectors submitted by the Researcher
This information can now be found on Gateway to Research (GtR) http://gtr.rcuk.ac.uk

Further Information:
The Manufacturing Technology Centre
The Engineering and Physical Sciences Research Council
UKRI Interdisciplinary Centre for CircularMetal
This information can now be found on Gateway to Research (GtR) http://gtr.rcuk.ac.uk

Project URL:
http://gow.epsrc.ukri.org/NGBOViewGrant.aspx?GrantRef=EP/V011804/1

Research Areas:
Transport Systems and Vehicles
Manufacturing Machine & Plant
Materials Processing

Topic:
Industrial Organisation (R&D)
Manufacturing Machine & Plant

Sector:
Manufacturing Machine & Plant

Region:
Home

Theme:
Materials Processing

Organisation:
Brunel University London

Starts: 01 January 2021
Ends: 31 December 2024
Value (£): 4,437,440

Related Grants:
06 Sep 2020
UKRI Circular Economy Centres Interview Panel
Announced

19 Aug 2020
UKRI Circular Economy Centres SfT Panel
Announced

Panel History:
Panel Date
06 Sep 2020
19 Aug 2020

Panel Name
UKRI Circular Economy Centres Interview Panel
UKRI Circular Economy Centres SfT Panel

Outcome
Announced
Announced

Project URL:
http://gow.epsrc.ukri.org/NGBOViewGrant.aspx?GrantRef=EP/V011804/1

Researcher Co-Investigators:
Aeromet International plc
Chinalco Materials Application Research
Constellium
GEFCO UK Ltd
Innoval Technology Ltd
Materials Processing Institute (MPI)
Oakden Hollins Ltd
Shanghai Jiao Tong University
The Manufacturing Technology Centre Ltd

Calzadilla, Dr A
Crown Technology
Giraffe Innovation Ltd
KTN
Metal Packaging Manufacturers Association
PinSENT Masons LLP
Supply Dynamics
UK Metals Council

Mendis, Dr CL
Coca-Cola European Partners
Defence Science & Tech Lab DSTL
GKN
MQP Limited
Recycling Lives
Tata Steel UK Limited

Cechin, Dr F
Hall, Dr R
Harrison, Professor D
Wang, Professor Z
Bleichwitz, Professor R

Further Information:

This information can now be found on Gateway to Research (GtR) http://gtr.rcuk.ac.uk