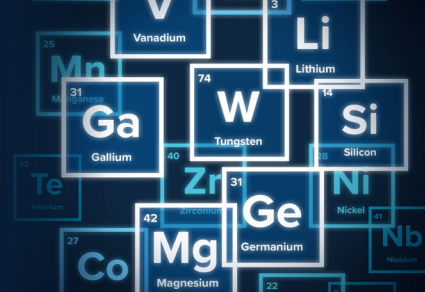


Current Research Projects Overview



Science, Research and Innovation

Accelerate the development of Australia's critical mineral resource endowment. Support energy, defence and technology industries. Build diverse, secure and sustainable supply chains with international partners.

VISION

MISSION

STRATEGY

Delivering Technical Breakthroughs

Build capabilities and downstream industries onshore. Help de-risk commercial projects and attract international investment and partnerships. Provide trusted information and advice to Government and leadership to Australia's R&D community.

The Australian Critical Minerals R&D Hub is hosted by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and was established in October 2022. Under this initiative, Australia's leading science agencies, Australia's Nuclear Science and Technology Organisation (ANSTO), Geoscience Australia, and CSIRO, are working collaboratively to develop urgent technical solutions needed to achieve the vision of the Critical Minerals Strategy 2023-2030 and Future Made in Australia plan.

LEADING SCIENCE AGENCIES

**Commonwealth Scientific
and Industrial Research
Organisation (CSIRO)**

Geoscience Australia

**Australian Nuclear
Science and Technology
Organisation (ANSTO)**

CSIRO



ANSTO

AUSTRALIAN
**critical
minerals**
RESEARCH & DEVELOPMENT HUB



CAPABILITY



CONNECTION



COLLABORATION

Capability

Scaling-up and commercialising critical minerals research and development.

Connection

Connecting the critical minerals R&D ecosystem, linking industry to R&D solutions, informing policy.

Collaboration

Supporting strategic international critical minerals collaboration.

KEY STRATEGIC PILLARS

Working with the Critical Minerals Office at the Department of Industry, Science and Resources (DISR), the Hub projects were developed in response to Australia's policy objectives and strategic priorities.

Value-adding/creating new industries: Develop sovereign processing technologies and create Intellectual Property needed to develop Australia's critical minerals resource endowment and industrial base, de-risk projects and attract potential foreign investment/partners.

Fill priority R&D gaps that would not be solved by the market in the immediate future, which are critical to Australia's national interests and the energy transition.

Develop R&D needed to secure the most concentrated international supply chains for materials essential to modern technologies that are most vulnerable to disruption.

Develop innovative ESG solutions that meet expectations of trading partners.

Increase the knowledge base needed to support data-driven decision-making on mining and processing of critical minerals ore bodies in Australia.

OBJECTIVES

PROJECTS



Research projects are collaborative, with all three agencies contributing their expertise and scientific infrastructure to deliver technical breakthroughs.

The Hub is also building strategic international R&D partnerships that will accelerate the development of technical solutions and promote Australian innovation with international investors. Current projects are:

- Mineral Criticality Assessment
- High Purity Silica/Quartz (HPS/HPQ)
- High Purity Alumina (HPA)
- Accelerating the Development of Australia's Rare Earth Resources
- Extracting Mineral By-Products
- Producing High Tech Metals and Materials



PROJECT

High Purity Alumina (HPA)

GOAL

Develop energy and cost efficient novel technologies for HPA production to support the development of downstream high value Australian manufacturing industries, such as synthetic sapphire glass.

HUB OBJECTIVES



CHALLENGE/ OPPORTUNITY

- HPA is used in semi-conductors, lasers, LED lighting, sapphire glass, catalysts, and lithium-ion batteries. Its versatility is attributed to superior chemical stability, remarkable scratch resistance, and the ability to withstand extreme temperatures.
- Australia has plentiful supply of aluminium-containing resources and potential to move downstream into high-tech manufacturing. The global HPA market is projected to increase from USD 4.63 billion in 2024 to over USD 15 billion by 2030, which presents a significant opportunity for Australia.
- HPA is a refined form of aluminium oxide currently produced from high purity aluminium metal, an expensive feedstock that requires three energy intensive and expensive industrial processes (bauxite refining, alumina smelting, and HPA production). The purest form of HPA (99.9999%) has a market value that can exceed USD 70,000 per tonne.

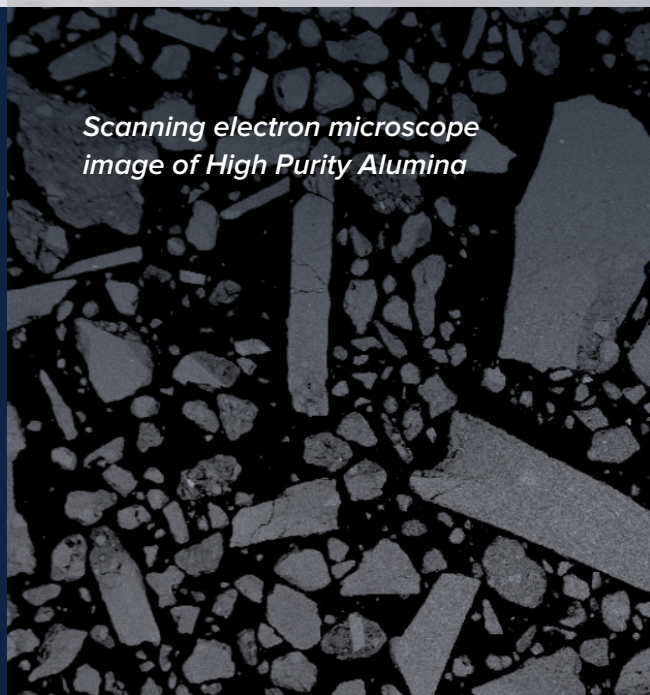
High Purity Alumina is used in several defence applications, and domestically and industrially in semiconductors, lasers, LED lighting, battery components, and tough optical coatings.



PROJECT STATUS

- CSIRO has developed innovative step change improvements in processing routes for different feedstocks, which have a lower carbon footprint and are more cost effective than incumbent technologies.
- It has built a small pilot plant to demonstrate the technology and is working with the nascent HPA industry to build analytical capability.
- Intellectual property and analytical techniques needed to accurately quantify low levels of trace impurities will benefit Australia's emerging industry and could support future production of synthetic sapphire glass. Investment in a trusted analytical facility or network will be needed to unlock Australia's potential in this emerging industry.

Scanning electron microscope image of High Purity Alumina



SUPPLY CHAIN

EXPLORATION | DISCOVERY

EXTRACTION

MID-STREAM PROCESSING

MANUFACTURING