

Ultra High Temperature (UHT) technology at Umicore

Hugo Morel – Executive Vice President

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Agenda

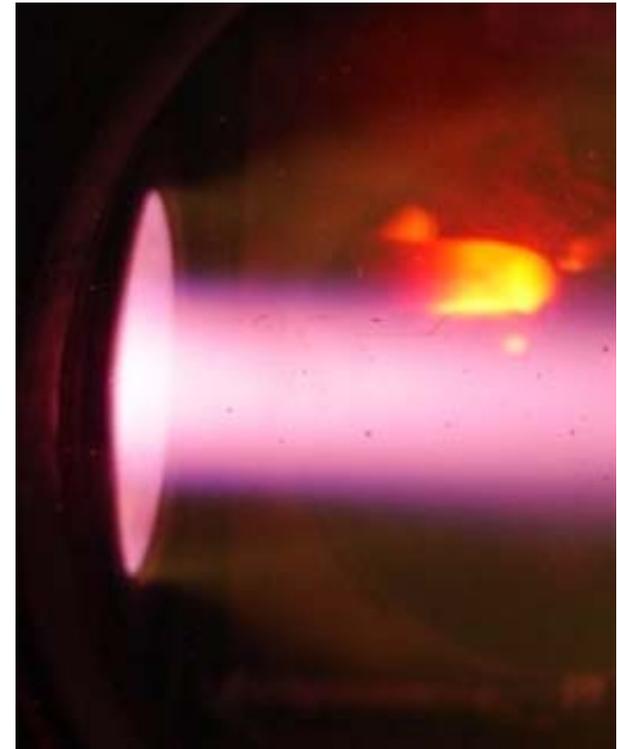
- UHT technology
- UHT project portfolio
- UHT pilot plant
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UHT technology

Umicore has a rich tradition in developing pyrometallurgical recycling processes. Today it is developing **Ultra High Temperature (UHT) technology** as one of its strategic new technologies.

UHT technology is based on ultra high temperature processes ($>3000^{\circ}\text{C}$) generated by applying plasma conditions.

Umicore is building a **UHT pilot plant** for the recycling of rechargeable batteries, and to pilot a set of breakthrough processes and technologies on an industrial scale.



UHT competitive advantages

Shift from classic to ultra-high temperature non-ferrous metallurgy offers **extended metal recovery opportunities** for a wide range of refining and recycling applications.

UHT allows for **optimal thermodynamic process conditions** and **slag engineering possibilities**, which enable

- Highly efficient metal extraction processes
- Production of less and cleaner slag
- Efficient gas cleaning and dust collection
- High energy efficiency

Compared to traditional technologies, **UHT advantages** that lead to higher value creation are:

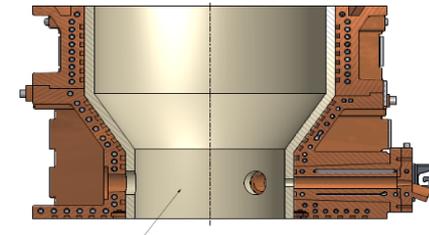
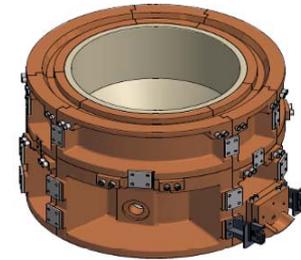
- Flexibility to treat a broad range of complex materials
- Cost efficient metal extraction processes
- Sustainable ecological footprint (energy efficiency, zero waste)
- Potential economic feasibility to treat previously landfilled materials, with a traditional low or even negative value, in combination with complex and more valuable products

Key enablers for UHT breakthrough potential

- 1) High density energy input into the metallurgical processes
 - Development of **proprietary plasma burner**

- 2) High heat resistant furnace technology
 - Design of **proprietary furnace** based on water cooled elements
 - **Slag engineering** allows to optimise furnace up-time and metal recovery in slags

- 3) Environmentally top performance technology
 - **Gas cleaning system** (as used in pilot plant)
 - **Energy recovery system** allows for steam, electricity and/or warm water co-generation



Intellectual property

Based on an entire set of patents covering a broad range of applications

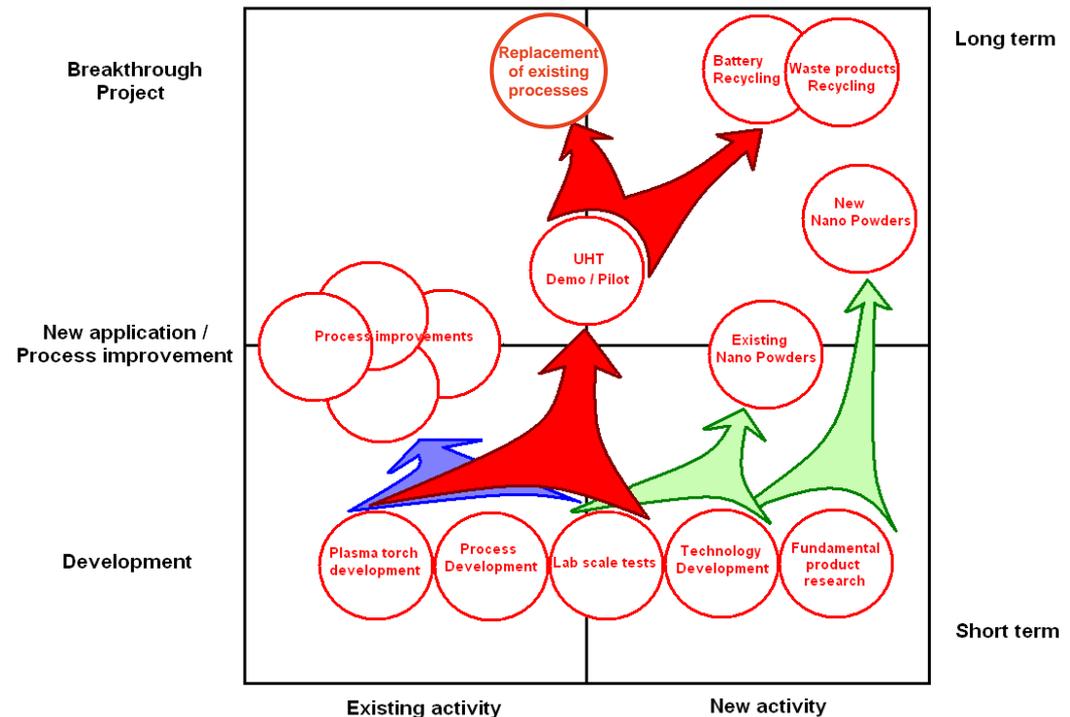
Umicore is the **sole owner** of the UHT technology



UHT project portfolio

The UHT technology opens the door to several exciting developments

- Development of new processes
 - Replacement of current recycling processes
 - Recycling of new input streams
- Synthesis of new materials
- Improvement of current recycling processes



UHT pilot plant

Umicore is building a **pilot UHT plant for recycling**, with start up foreseen mid 2011

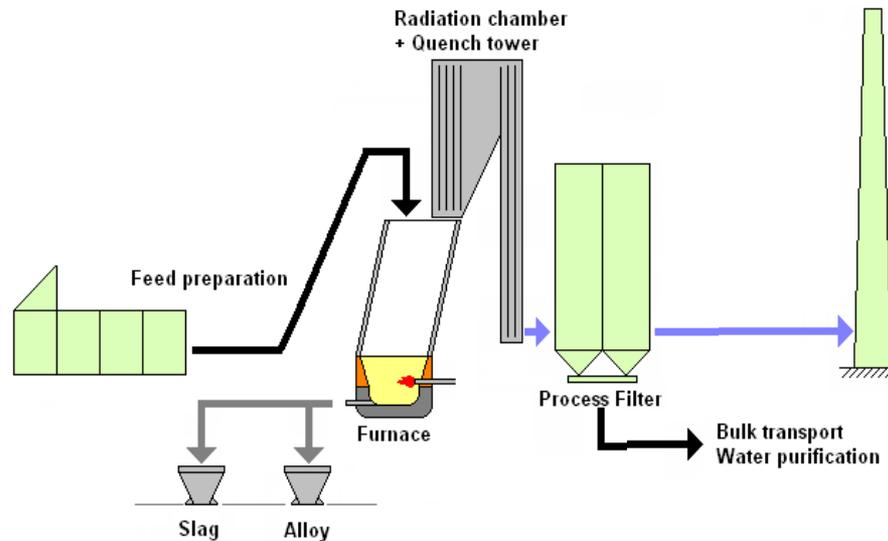
The plant will be Umicore's first industrial plasma smelter and will have a capacity to process **7,000 tonnes** of material per year

It will be used to

- **Recycle rechargeable batteries**, allowing Umicore to demonstrate its sustainable closed loop business model.
- Pilot a set of **potential breakthrough applications** on an industrial scale

Total investment of some **€25 million**

Pilot plant schematic process flow



Recovered metals end up in the slag, alloy or filter depending on the processed raw materials and process settings

UHT pilot plant illustrations



Conclusion

By using a high density energy (plasma) input into our metallurgical processes Umicore is able to shift from conventional to ultra high temperature applications.

Such a shift offers extended metal recovery opportunities for a wide range of refining and recycling applications.

The UHT technology is more cost efficient and environmentally cleaner than competing and traditional technologies.

The proprietary UHT technology is a key enabler of Umicore's strategy in recycling.

Forward-looking statements

This presentation contains forward-looking information that involves risks and uncertainties, including statements about Umicore's plans, objectives, expectations and intentions.

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As a result, neither Umicore nor any other person assumes any responsibility for the accuracy of these forward-looking statements.

Hugo Morel

Executive Vice-President Recycling



Hugo Morel holds a Masters degree in Metallurgical Engineering from the University of Leuven. He joined Umicore in 1974 and held several positions in production, commercial, strategy and general management. He headed the Zinc Chemicals business unit from 1996 to 1997 and was appointed to his present position in 1998. He joined the Executive Committee in 2002.