

CASE STUDY: Plasma Treatment Assisted Digestion of Rare Earth Elements

IPRI.Tech's UHTP™ Technology Transforms REE Recovery

The Challenge

Traditional REE extraction from phosphate, carbonate, and silicate ores requires high-temperature roasting (1,200°C+), aggressive chemical leaching, and complex separation to control radioactive byproducts (NORMs). This makes many REE deposits economically marginal.

The Solution: PAD™ with UHTP™

IPRI.Tech's PAD™ uses Ultra High Temperature Pyrometallurgy™ (UHTP™) (~10,000°C) to transform REE ore chemistry in seconds:

1. Dissociation: REE ore particles fall through the reactor for <1 second, breaking molecular bonds into elemental components
2. Controlled Recombination: Elements recombine as reactive oxides (rare earth oxides separate from radioactive NORM oxides)
3. Selective Leaching: Light acid dissolves REE oxides while leaving NORM oxides intact – clean separation

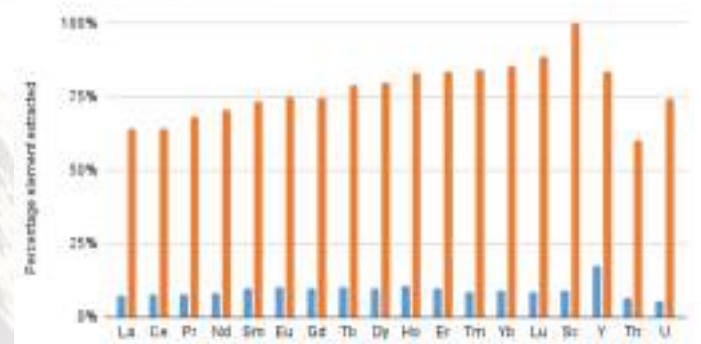
Result: >95%+ REE recovery with superior radioactive waste control.

Key Advantages

Metric	Traditional	UHTP™ PAD™
Recovery Rate	85–90%	95%+
Leaching Temp	60–90°C (heated)	20–25°C (room temp)
Chemical Use	Aggressive	40–80% reduction
Processing Time	8–16 hours	4–6 hours
By-Products	Waste	Phosphoric acid, iron

Real-World Results

- ✔ >95%+ REE extraction from complex ores
- ✔ Clean NORM separation via light acid leaching
- ✔ 40–80% reduction in hazardous chemicals
- ✔ Room-temperature leaching (eliminates roasting furnaces)
- ✔ Multiple valuable by-products recover additional revenue



REE Extraction Comparison: Traditional vs. UHTP™ PAD™

Why It Matters

IPRI's PAD™ makes economically marginal REE deposits viable, enabling:

- Lower-grade ore processing
- Reduced China dependence (70% global capacity)
- Distributed, resilient REE supply chains
- Environmental compliance and sustainability

About IPRI.Tech: Global leader in advanced mineral processing via Ultra High Temperature Pyrometallurgical™ (UHTP™) technology. 40+ years expertise in plasma treatment, mineral processing, and geometallurgy.

Learn More: IPRI.Tech | Contact IPRI for REE processing consultation, Contact@IPRI.Tech