



Advanced Materials Development Company, Focused on Critical Specialty Elements at the Crater Lake Scandium-Rare Earth Property

It is becoming quite apparent that the next mineral commodity super cycle will be driven by the electrification of the global economy. A lot of attention is being given to Copper - Nickel - Cobalt, as well as to Graphite and Lithium (the Battery elements). Many other elements are also considered as speciality materials that are critical to the Green economy. This includes the Rare Earth Elements (REE): Tungsten, Niobium, Vanadium, and Scandium.

Scandium

When Mendeleev was assembling the Periodic Table of Elements in 1869 he was able to predict the existence and properties of scandium. It was not until 1879 that the element was actually identified in natural minerals by

Swedish chemists and linked to the predicted element that was then given the name "Scandium" as it was, at that time, only found to exist on the Scandinavian peninsula. Metallic scandium was not produced until 1937.

Today scandium is used mainly in:

- Durable Aluminum "Superalloys" (0.2% to 0.4%Sc) - highest strength-to-weight ratio compared to other similar alloys (for use in vehicles, aircraft, and sporting goods).
- Solid oxide fuel cells - long lifespan, high efficiency, low operating temperature - power and heat generation in buildings, auxiliary power units for electrical systems in vehicles.
- Scandium iodide - added to mercury vapour lamps to simulate natural daylight, (used in televisions, screens for movies and sports stadiums).

Scandium output comes principally as a by-product of Sn-W, Fe-Ti-V, U, and REE production in China, Kazakhstan, Ukraine, and Russia. Global production is estimated to be about 35 tonnes of Sc₂O₃ per year. By-product production is often unreliable and as a result prices are unsustainable (too high). Adoption of scandium-aluminum alloys in vehicles, aircraft and wind turbines may well drive demand for Sc₂O₃ to over 100 times the current annual supply.

New sources of production are being examined in Australia, the USA and Canada, and new by-product production has been announced in Canada and the USA.

Of primary interest in Canada, is the Crater Lake Project of **Imperial Mining Group (TSXV: IPG)** in Quebec.

The Crater Lake property, the asset that started the Company, continues to offer value as a driver for IPG. The Crater Lake geology consists of a ring dike intrusion that holds scandium, niobium, tantalum, and rare earth element mineralization at potentially significant and economic quantities. Drilling and sampling has confirmed grades that exceed 1,600 g/t scandium in surface samples and 310 g/t scandium over 113.9 m in drilling.

An estimate of Mineral Resources in the TG zone was received in September 2021 including:

- Indicated Resources of 7,300,000 tonnes grading 282g/t Sc₂O₃ and 1,440 g/t REEs
- Inferred Resources of 13,200,000 tonnes grading 264g/t Sc₂O₃ and 1,370g/t REEs

This far exceeds the minimum threshold resource that had been internally set for a 20-25-year notional mining operation, or 10 million tonnes. Other scandium-rich targets are known on the property and provide the prospect of future growth in resources and production.

The unique characteristics of the mineralization (in that it is hosted in a magnetic mineral) will allow for simpler mill recovery to a high-value concentrate at the minesite. IPG has developed an innovative and patentable process for extraction of scandium and rare earth elements from

Crater Lake concentrates as part of its' current Phase 3 Hydrometallurgical Development Program. Results from this work show very high recovery of both scandium and rare earths for all mineralization types defined in diamond drilling on the property.

The two-stage hydrometallurgical extraction method entails a high-pressure caustic leach (HPC) followed by hydrochloric acid leach of the HPC residue. The new method showed remarkable recovery of scandium and the rare earth elements from Imperial's Crater Lake Sc-REE mineralization:

- The method showed scandium recovery to primary leach solution (PLS) of 87% for the samples tested.
- The recovery of total rare earth element, including yttrium (TREE+Y) of 84%, from the samples tested.
- The high recoveries of Sc and TREE+Y from the samples show that the method has excellent efficacy in extracting Sc and REE from the different mineralization types observed in drilling.

The project also fits in well with Quebec's significant aluminum industry based on the low-cost hydropower in the province. All the regional aluminum producers have developed scandium-aluminum alloys and could be partners in this product development process. In fact,



the Company is looking at placing its Hydrometallurgical processing facility adjacent to the existing aluminum refineries in Sept Isle or Baie Comeau.

With the resource estimate in hand, and the completion of the metallurgical flowsheet, work continues on delivering a Preliminary Economic Assessment (PEA) for the project in the late Fall of 2021 to early 2022.

In September 2021 IPG closed a non-brokered private placement of 5,460,000 units at a price of \$0.15 per unit, for an aggregate gross proceeds \$819,000 and then completed a second private placement of 3,516,666 units for an aggregate gross proceeds \$527,500. With more than \$1.3M of new money raised they are able to complete all work planned on the project.

Investment Perspective



Recent share prices remain below the high for the year (2021) seen in early June, and thus are significantly undervalued, given the advanced state of progress for the project.

Results from the PEA, due late fall or early winter, are expected to be quite positive for the Company.

IPG aims to create a new scandium supply business featuring both a secure, long-term source and price point disruption to carve out their place in the market. This business model may also benefit from the recent critical materials agreement with the USA and other non-Chinese economies seeking to break Chinese control of supplies.

The management team and board are strong, with critical mineral deposit discovery and development expertise. Mr. Jeff Swinoga, a highly-accomplished mining executive with more than 25 years of executive and management experience in the areas of finance, project development and project construction has accepted to assume the

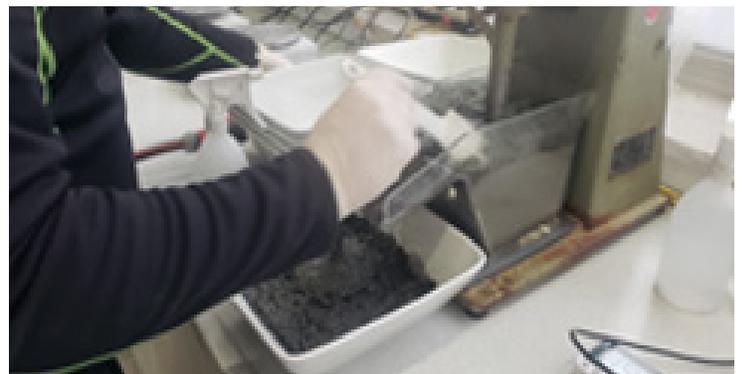
role of Chairman of the Board. IPG adheres to a well-developed ESG framework, operates in a mining-friendly jurisdiction (QC), and maintains strong relationships with local indigenous communities.

Today's world demands lighter and stronger materials to improve fuel economy, corrosion resistance and product durability. However, the current supply constraints and market costs are delaying the commercial development of scandium-aluminum alloy products. IPG expects that the low overhead and projected expenses will allow it to deliver scandium below tipping point for broader use (\$1,250/kg USD), and drive demand up as a result.

IPG has executed a letter of intent with Eck Industries to develop scandium-modified aluminum alloys for Transportation, Defence and Aerospace markets. Together they have completed a successful series of tests for EV battery boxes based on scandium-modified aluminum-magnesium (535-series) alloy components.

Imperial and FusiA Groupe, have been awarded funding, as a 70%:30% Consortium, for a scandium-aluminum material R&D project valued at CAD\$2,600,520 from a Federally-funded, not-for-profit institution. The project will focus on the industrialization and the development of a vertically-integrated supply chain for a scandium-aluminum alloy for 3D printing.

Remember that in the early days of Sudbury, the International Nickel Company had to build a business case for Nickel by developing processing and recovery technology, and by creating and marketing new end uses. IPG seems to be walking that path with Scandium.



Publicly-Traded Scandium Comparables

COMPANY	TICKER	MARKET CAP (\$MM CAN)	DEPOSIT TYPE	SCANDIUM GRADES (Sc ppm)	TOTAL RARE EARTH GRADES (%)	OTHER CONTAINED METALS (%)	PROJECT NAME
Sunrise Energy Metals Limited	ASX:SRL	\$152.2	Laterite	414 (300 cut-off)	Nil	0.65% Ni; 0.13% Co	Sunrise, NSW
Australian Mines Limited	ASX:AUZ	\$99.0	Laterite	109	Nil	0.75% Ni; 0.09% Co	SCONI, AUS
NioCorp Developments Ltd.	TSX:NB	\$249.3	By-product of niobium mining	58	Nil	0.54% Nb	Elk Creek, NE, USA
Scandium International Mining Corp.	TSX:SCY	\$55.4	Laterite	261	Nil	Nil	Nyngan, AUS
Platina Resources Limited	ASX:PGM	\$28.7	Laterite	380	Nil	0.10% Ni; 0.15% Co	Owendale, NSW
Texas Mineral Resources Corp.	OTCQB:TMRC	\$103.6	By-product of rare earth mining	<1	0.07%	0.11% Zr	Round Top, TX, USA
Imperial Mining Group Ltd.	TSX-V:IPG OTCQB:IMPNF	\$24.3	Hardrock	260-1,634	0.35-1.7%	0.50-1.0% Zr	Crater Lake, QC, CAN

Where: Ni=nickel; Co=cobalt, Zr=zirconium; Nb=niobium; **NOTE:** Resources figures obtained from filed company reports.



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An investor in mining companies for more than 40 years, Stephen has more than 45 years Mineral Industry experience, including 25 years of Management and Board service with junior mining companies. He is experienced in the full life cycle of mining projects, from grass roots exploration, through resource building, financial evaluation, construction and development, operations, and closure. He is a Qualified Person for NI 43-101 reporting and is skilled at mining project valuations at all stages.

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Compensation for this article came from our monthly fees. CHF Capital Markets Inc. and partners Ottavio Cavalcanti and Cathy Hume own shares of IPG.

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