

SCANDIUM – The Alloy Spice

By Tony Grant-Taylor

Rare earth elements (REEs) comprise 17 chemical elements including scandium – a silvery white metal that is also known as 'Element 21' or Sc on the periodic table. Like other REEs scandium isn't so much 'rare' but very rarely available in concentrated deposits, occurring instead as a trace element within other ore deposits.

Scandium does, however, have some rare and highly beneficial qualities when used in even tiny amounts of less than one per cent as an additive or 'spice' metal to enhance the strength of alloys such as aluminium. Those benefits were realized by the Soviet aerospace industry when developing MiG fighters in the 1970s and more recently by the premium sporting goods manufacturers for high end bicycle frames, baseball bats and golf clubs which each rely on lightness and strength at reasonable cost.

Scandium also has applications in solid oxide fuel cells (SOFC), which generate electricity and heat through an electro chemical process without combustion, noise or moving parts. The highly efficient compact generating units have caught the attention of major US companies including Apple, Google and Wal-Mart. Scandium is a key ingredient in enhancing the efficiency of these environmentally friendly energy generators by producing greater electrical and thermal energy from the same amount of fuel.

This rare earth element also plays a role in lighting that not only

deposits in their leases Metallica discovered two large, high-grade scandium deposits – the shallow deposits have been estimated to potentially yield 5 million kilograms of scandium oxide. That's enough for Metallica to foresee production of 50,000 - 100,000kg of scandium per annum for many years and be a world-beater to supply reliable quantities.

Recognising the potential of the scandium find Metallica renamed the Greenvale leases (which were initially dubbed Metallica's NORNICO project) to now be known as SCONI giving scandium (Sc) the prime spot in the acronym Scandium Cobalt Nickel. Mining and processing operations are planned to be up and running by 2016 but first Metallica must help 'create' a market.

Managing Director, Andrew Gillies, knows he faces a chicken and egg situation but he believes if there's a reliable supply, then scandium's two potential major markets – the aluminium alloy industry and fuel cell manufacturing – will ramp up their use of the element. "You only need small amounts of scandium in alloys to make them stronger and make welds as strong as the alloyed metal itself," says Gillies.

He spoke of the challenge to build the market: "It's a bit like the aluminium market 100 years ago. People knew the metal's potential but there had to be a catalyst to make it commercial.

Bob McKee (right) from KBM Affilips presents an aluminium/scandium 'waffle' to Metallica's Managing Director Andrew Gillies (left) and CEO Gavin Becker (centre)



Metallica's high purity scandium oxide

uses less energy per lumen than conventional lighting products but also mimics natural light making it easier for reading and colour recognition.

Scandium would appear to be a wonder metal and in high demand but despite the currently identified benefits (and potentially a great many more applications) only around 10,000kg per annum are used. That's largely due to its scarcity – it is rarely seen in deposits of more than 30g/t and mineable deposits of 200g/t are extremely rare. Supplies are scarce but scandium commands premium prices of over US\$3,000 per kilogram making it one of the most valuable metals by weight in the world – provided you have a source and a market.

Enter Brisbane based Metallica Minerals Ltd., which acquired the former cobalt-nickel mining leases at Greenvale, 200km west of Townsville. Metallica Minerals is chaired by veteran resource industry figure, David Barwick, and led by entrepreneurial geologist, Andrew Gillies.

Greenvale produced nickel ore from 1973, providing part of the feed to the Yabulu nickel-cobalt refinery south of Townsville but the mine closed in 1992. Metallica Minerals now controls the former mining area and a swag of exploration sites in the surrounding district. While assessing the nickel-cobalt laterite

WWII ultimately turned aluminium into the aerospace industry's major structural metal. By the end of the war nearly all aircraft were made from it."

Metallica has entered into a strategic alliance with European master alloy producer KBM Affilips for scandium supply and aluminium-scandium alloy market development for products such as aerospace components. Metallica has also signed a heads of agreement with Bloom Energy to supply scandium oxide for its high-tech SOFC fuel cells. Bloom Energy will take 30,000kg to 60,000kg of scandium oxide per annum depending on Metallica's production and Bloom's annual needs under the agreement but Gillies sees huge potential in the industry for the fuel cells, which are designed to turn gas into electricity and useable heat. "They can come in various configurations, to fuel a home, a building, a shopping centre or a town," says Gillies.

With these two key alliances Metallica can reliably produce big quantities of the rare metal but Gillies would like an aerospace partner to enhance SCONI's commercial feasibility. That would realise Metallica's goal to become the world's major, long-term reliable supplier of scandium – taking it from current niche markets for aluminium alloys and bicycle frames to mainstream aerospace applications and the new power source of SOFCs.