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## Mintek and Mondo Minerals conclude licence agreement for provision of nickel sulphide bioleaching technology

Mintek has concluded a licence agreement with talc producer Mondo Minerals for Mintek’s proprietary nickel sulphide bioleach technology at Mondo’s Vuonos talc production site in Finland at the signing ceremony held at Mintek on 10<sup>th</sup> November.

Mondo is the world’s second-largest talc producer. The company is headquartered in Amsterdam in the Netherlands, and its mining operations are located at two sites in Finland: Sotkamo and Vuonos. A by-product of the talc mining operations at both sites is a sulphide concentrate that contains a valuable quantity of nickel and a small amount of cobalt, but which also contains arsenic. While concentrate sales to smelters had been the long-established method of commercially dealing with the concentrate, Mondo chose to move downstream and create a value-added nickel product to enhance its revenue and profitability streams.



*Dr Christian Kather of Mondo Minerals (left) and Mr Abiel Mngomezulu, President and CEO of Mintek (right), exchanging copies of the licence agreement.*

Mondo tested and evaluated multiple processing options before identifying Mintek's bioleaching technology as the most suitable for the recovery of nickel and cobalt from this side stream. The agreement provides exclusivity to Mondo with respect to the bioleaching of side-streams from talc production, in return for Mondo's financial and intellectual contribution to the technology development.

"This licence agreement is the culmination of a metallurgical test work programme conducted at Mintek over the past two years, in which the application of Mintek's technology to treat this by-product from Mondo's talc production process has been developed and successfully demonstrated," said Mariekie Gericke, head of biometallurgy in Mintek's Biotechnology Division. "A feasibility study has shown that bioleaching, combined with a nickel- and cobalt precipitation process, is an economically-viable option for Mondo to derive value from this by-product. An important aspect of the process is that it includes the production of a stable arsenic-bearing waste to be impounded."

In terms of the licence agreement, Mintek will provide on-site support at Mondo's facility during several stages of the project implementation. "This will include the provision of the process start-up material, training of Mondo's operational staff, and technical assistance during plant commissioning," explained John Neale, a specialist engineer in Mintek's Biotechnology Division, who will be responsible for the transfer of the technology to Mondo.

"Although this is a relatively small plant, the metallurgy is complex, and it will be the world's first commercial-scale implementation of a bioleaching process for treating a nickel sulphide concentrate.

Mintek has previously supplied its bioleach technology for the treatment of refractory gold concentrates to projects in Australia and China, and this project extends our product offering into nickel and cobalt." At full production, the plant will treat approximately 12,000 tonnes of nickel concentrate per annum, producing about 1,000 tonnes of nickel annually.

The product is a mixed hydroxide precipitate containing nickel and cobalt. "Mintek has been actively developing bioleaching technologies for the past 30 years," commented Peter Craven, general manager of business development at Mintek.

"This project will enhance our reputation as a global leader in metallurgical innovation, and in signing this agreement with Mondo; Mintek is drawing on decades of experience in the field of biohydrometallurgy. We have developed an excellent working relationship with Mondo, and we are looking forward to implementing the process with them next year." The plant is already under construction, and is being designed to withstand the cold winter conditions in Finland. Commissioning is currently scheduled to begin in August 2015.





## **MAM-14 Symposium highlights opportunities for innovation and research commercialisation**

The MAM-14 - International Symposium on Macro-and Supra-molecular Architectures and Materials held between 23<sup>rd</sup> and 27<sup>th</sup> November at Emperors Palace in Johannesburg, provided a platform to discuss the critical elements of research and application of innovation and commercialisation.

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This international event was the first of its kind in South Africa and the 7<sup>th</sup> in the series of MAM conferences. Previous conferences were hosted in India, Jamaica, Germany, Japan, Montana (USA) and South Korea. The conference focused on Innovation to Commercialisation in SA and highlighted the importance of entrepreneurship. Amongst those attending were Nobel laureates Prof. Robert Hüber and Prof. Klaus von Klitzing, government officials and international delegates from more than 30 different countries.

Dr Robert Tshikhudo, Head and Director of the DST/Mintek Nanotechnology Innovation Centre (NIC) and MAM-14 Conference Chair, discusses the impact of the symposium in addressing the national concern over bridging the gap between research and development. According to Tshikhudo, the conference addressed the performance of the South African Innovation System over the last 20 years and analysed the critical roles of Innovation in the National Development Plan (NDP) or Vision 2030 of the Republic of South Africa.

When asked on how he felt regarding the main model put forward as a possible solution to the scarcity of commercialisation of Research and Development products in South Africa he said that, "South Africa has strategic frameworks/policies in place to address innovation but the challenge remains on the implementation of these policies. Public-Private-Partnerships and the establishment of local entrepreneurs and start-ups should be encouraged and fully supported to advance technology innovation and commercialisation at all levels and the government should prioritise funding models to address this.

To him, product development in South Africa and in particular at the Science Councils should be driven by

- (i) Innovation (replacing existing products and creating new ones)**
- (ii) Market (informed by industry landscape) and**
- (iii) Social needs**

It should enforce the development of technologies which address both economic and social needs and Innovation culture must be introduced and sustained at R&D institutions. He believes that young people

should be encouraged and supported to develop innovative ways of thinking. Innovation should be customer-centric and cross functional teams should be involved in the value chain. Elaborating on policies he said that there is also a need for political direction to accelerate technology innovation and commercialisation in line with the national system of innovation.

To be successful, SA must identify and monitor SMART innovation targets informed by the international guidelines and the level of investment. The symposium also focussed on promoting the role of the youth in South African innovation, it also recognised and encouraged women to lead in SA technology innovation by allowing them to be actively involved and responsible in various activities at the conference. Speaking at the conference, Honourable Minister, Adv. Ngoako Ramatlhodi said that "It is exciting to know that South Africans, especially the Youth, have the opportunity to exploit the abundant raw materials and resources to enable them to become innovative and become entrepreneurs and are able to compete at the same level as their peers all over the world as producers and manufacturers. This conference should serve as a platform to highlight the raw materials that we have and can exploit to manufacture products in South Africa".

## **ANALYTICAL SERVICES DIVISION UPGRADE TO STREAMLINE EFFICIENCY**

Refurbishments to Mintek's Analytical Services Division are expected to start in the first quarter of 2015, to expand the division's services to the metallurgical and mining industry and to enhance Mintek's status as a "one-stop shop".

Mintek is re-engineering the division to create an open-plan laboratory where ore weighing, sample preparation, testing, analysis and results processing are performed in successive stages to significantly streamline efficiency. According to Joe Baloyi, Analytical Services Division Manager, the refurbishments are expected to increase productivity, efficiency and turnaround time of at least 25% after completion of the refurbishments.

"We need to move away from the entrenchment of haphazardly conducting analytical services and evolve to an approach where each analysis and process seamlessly follows the next to allow for an enhanced workflow," said Baloyi. He believes that the trend of analytical laboratories shifting from manual analytical process intervention to process automation - which reduces human error and turnaround time - is increasing. The upgrades will reduce any subsequent challenges during the process.

He highlights that being able to perform analytical services, such as dilutions, through online analysis systems also allows for better quality results. The Analytical Services Division is investigating various means of streamlining efficiency by automating processes in the wet classical chemistry subdivision, he adds, citing time consuming titration processes as a key challenge in reducing analysis turnaround time.

The division further aims to consider the possible discontinuation of manual processes, such as manual titrations, and the introduction of autotitrators, which will facilitate the titrations and automatically print the results. Human resources would only be required for the calibration requirements, similar to those that are currently performed in the inductively coupled plasma spectroscopy areas.



Dr Robert Tshikhudo

## Accolades for AMD research Heads

Mintek’s research Heads Dr Robert Tshikhudo and Dr Raymond Hewer continues to bring research pride to Mintek after they were honoured with the Biotech Fundi Capacity Builder Award 2014 during the Gauteng Biotech Awards excellence awards held at the innovation hub in Pretoria on 21<sup>st</sup> August.



Dr Raymond Hewer

The Biotech Fundi award acknowledge efforts to develop capacity in the field of biotechnology in South Africa and is awarded annually to an individual that excels in empowering others by imparting his/ her knowledge and skills. They were presented with these awards respectively for their contributions and efforts in contributing to Biotechnology in South Africa whilst empowering others by imparting their knowledge and skills.

Tshikhudo who is the Head of Nanoscience at Mintek received the award for his contribution in nanobiotechnology. He has been instrumental in building and leading gold nanobiotechnology research and infrastructure capacity at Mintek. He has trained students and researchers in this area and also forging strategic local and international collaborations to expose students and Mintek researchers to the international laboratories. These efforts have enhanced Mintek’s global competitiveness, innovation and importantly empowered trainees to become well rounded scientists.

“This award is a result of team effort and I give credit to the NIC researchers. I believe that the future for nanobiotechnology looks bright and Mintek should take a leading role in this area particularly in addressing innovation and commercialisation aspect of this important sector in line with NIC Vision 2025” said Tshikhudo. Dr Hewer was presented with the award for the quality of training he provided, number of individuals trained as well as his commitment and dedication to training. To him, the award appropriately represents Mintek as an organisation committed to capacity development and employee training. Both recipients were awarded with a trophy, certificate, personal cash prize and a project funding contribution.

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