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STREAMING SILVER

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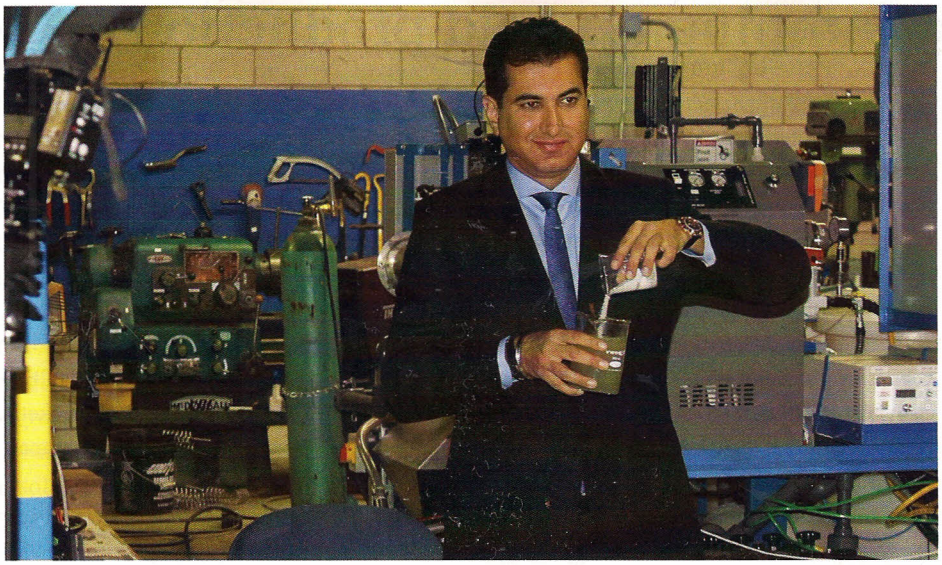

Bundeep Singh Rangar, Chairman and CEO of NanoStruck Technologies, in the research and development lab. Photo courtesy NanoStruck Technologies Inc.

NanoStruck seeks treasure in tailings

By Simon Rees

For mining companies, it is one of the most fundamental of issues, the disposal of tailings and their safe containment. But thoughts have also turned to the reprocessing of this material to secure the residual metals still lying within.

With this in mind, Ontario-based **NanoStruck Technologies Inc.** [NSK-CSE; NSKTF-OTCQX; Frankfurt-8NSK] is formulating a system, called NanoMet, that seeks to retrieve this latent wealth in an environmentally-sound way. "Within the tailings are minute particles of precious metals, such as gold or silver, platinum and palladium, etc., so our first task is to carefully analyze the mineralogy," NanoStruck CEO Bundeep Singh Rangar told *Resource World*.

Once the parameters of the tailings are determined, the material is then ground down to a specific size in order to help release the metal. "The tailings are reduced to a micron level determined by the initial microscopic analysis," Rangar said. "The next step is to liberate the precious metal using an air gravity separator, which is literally shaking the ground-down tailings [and] separating the various elements based on the density levels."

"Now that's important for gold, and particularly important for platinum and palladium, which have different density levels but are often quite close to each other. To some extent this applies to silver too," he explained, adding that this first process has recovery rates varying between 15-40%.

The next process for the tailings is a chemical one, where the material is mixed with an acid to form a solution. "[Here] we leach out the precious metals from the tailings mixture. The particles that weren't liberated or were too small, or too complex, for the physical process are liberated at this stage," Rangar said.

The third and final stage utilizes organic compounds as the basis of a filtration system, capturing the metals from the acid solution. "The next process involves the use of bio-nano material. I say bio because the powder we use at this stage is a derivative of crustacean, shrimp, lobsters and crabfish shells," Rangar said. "[The properties] of the crustacean shells, technically the chitosan copolymer, are inherently adsorbent."

"In the case of mine tailings, you can configure [the powder] for trapping the desired mineral elements like gold, silver or platinum," he continued. The powder is then treated and the metals reclaimed. Once processed, the powder is inert and can be used as fertilizer or even as construction material.

"So it's very environmentally friendly ... the only thing that could be seen as toxic, the acid, is simply recycled and reused," he said. "Secondly, it's not a process that consumes a great deal of power, which means it also fits in with the company's carbon footprint policy."

NanoStruck is developing a project in South Africa that will be important to stress-test the process under operational conditions. "The project in South Africa is ongoing," Rangar said. "It will [involve] advanced testing and the tailings are rich in platinum group metals [PGM]. Over the past few months, we've been optimizing the process here in Canada before we undertake deployment."

Ultimately, NanoStruck hopes the fieldwork will prove the technology on an industrial scale. "There will be two things to consider: firstly, and obviously, there will be a drop-off between the results obtained under laboratory conditions and the results you attain in the field. Primarily, this is due to the nature of the ore, because it will not be uniform and or consistent," he said.

"Secondly, there are other issues at play. For example, the air gravity separator and the gravitational forces applied will be affected by variables such as atmospheric pressure and altitude ... So you have to take those parameters into account for specific sites and configure accordingly," he added.

"If you record a 90% plus recovery rate in the laboratory conditions, a drop-off rate can be expected at something like 20%, leaving you with a 70% recovery rate in the field," he said. "But then compare this with other methods, the ones that use a conventional cyanide-leaching process. These achieve only around 10-12% recovery rates."

One of the next steps for the company is to investigate the potential for expanding the technology's scope. "Can we use this for base metals? Can we use this for rare earth metals?" Rangar asked. Overall, the prize could be rich indeed, with Rangar adding that there is an estimated $1 trillion worth of metals still locked within tailings around the world. One might be tempted to say that where there are tailings, there could be treasure. ■