

# Oak Ridge National Laboratory Scientist on Simplifying the Recovery of Rare Earths

August 31, 2015 – In a special **InvestorIntel** interview, Publisher Tracy Weslosky speaks with Ramesh Bhave, the Senior Research Scientist, for the Materials Science & Technology Division for the Oak Ridge National Laboratory (ORNL) about his role as the lead for the Membrane Solvent Extraction project for rare earth separations. Ramesh explains the history for the development of the MSX Technology (Membrane Assisted Solvent Extraction of Rare Earths), a ground-breaking process for the recovery of rare earths from old magnets and e-waste that has drawn much interest in the industry, was commissioned by the U.S. Government as part of their sustainability initiatives. He then goes onto explain how the ORNL membrane-assisted technology patent provides a selective barrier that limits unwanted material from disrupting the chemical recovery process of rare earth materials, which simplifies and reduces steps in the solvent process – making it more cost effective.

**Tracy Weslosky:** It's my understanding Ramesh that several years ago that the United States government gave the Oak Ridge National Laboratories upwards of \$100 million dollars to provide research and development for the extraction of some of these critical materials, like rare earth elements, with a membrane-based solvent. Can you just tell us, you know, when you joined Oak Ridge National Laboratory and how you got involved in this process?

**Ramesh Bhave:** I joined the Oak Ridge National Laboratory in April of 2008. As the Critical Materials Institute was being formed, we were looking at innovative ways of addressing the

recovery of rare earth elements. We have a lot of expertise in membrane separation so that's how I got involved in looking at ways to separate rare earths from used magnets or other supplies.

**Tracy Weslosky:** Can I ask you, this membrane assisted solvent extraction of rare earths technology, which we started calling the MSX Technology, Dr. Luc Duchesne from InvestorIntel tells me that your name is on the patent along with several others. Is that correct?

**Ramesh Bhawe:** Yes, that's correct.

**Tracy Weslosky:** He also said that you're probably the person I need to ask, because our audience is interested in why this technology is so revolutionary and ground-breaking. Can I get you to explain why this technology is so different and arguably superior to some of the other extraction processes?

**Ramesh Bhawe:** Sure. The traditional extraction processes either involves to precipitate the rare earths from – into solutions or use the conventional solvent extraction. Both these processes result in significantly large steps in order to obtain the rare earths in the pure form. As a result the technology is very difficult to scale and is not as cost effective. If you take the example of the conventional solvent extraction processes, that involves extraction stages, stripping stages and there is always co-extraction of undesirable components, such as non-rare earths. If there was a way by which the extraction process can only selectively extract rare earths only and not the non-rare earths, it would simplify the downstream processing because you will obtain the rare earths in the pure form and hence, a very amenable (process) for recovery. Our process allows the selective recovery of only rare earth elements and therefore I think it's a significant step ahead of the conventional technologies that are available today.

**Tracy Weslosky:** Okay. I'm trying to understand this and I'm sure our audience is all leaning forward to understand what you just described. Basically what you're saying is that membrane-based process, solvent process, allows you to ramp up to a commercialization and to produce more and in a more cost effective manner. Is that correct?

**Ramesh Bhave:** Yes, that's correct...[click here](#), to access the rest of the interview