

The Last Large Gathering



In August, I had the pleasure of attending the 23rd Rare Earth and Future Magnets and Their Applications Workshop in Annapolis, MD. This series of workshops was conceived in 1974 by the late Dr. Karl J. Strnat at the University of Dayton. The workshop is usually a nice mix of academics, raw material suppliers, magnet producers and magnet users, all who look at permanent magnets from both a technical and commercial point of view. In a holistic way, the workshop has chronicled the progression of permanent magnets from samarium cobalt (1-5 and 2-17) to neodymium iron boron (bonded and sintered) to the next permanent magnet material, yet to be determined. (Note the insertion of “Future Magnets” in the name of the conference for the first time.)

This year’s workshop was particularly well-attended, with well over 200 people in Annapolis. The timing was good for many attendees. During the rare earth price spike of 2010 to 2011, many new magnet-related projects were funded. We are now seeing the results of this research. Several types of new materials were described, all with the common thread that they contained less neodymium or dysprosium, ideally neither. However, the rare earths have not gone away entirely. People have explored the dysprosium saving technology, mostly through some form of grain boundary diffusion. In addition, they have looked at other rare earths to replace neodymium, mainly cerium. There was also a very lively dialogue on recycling, an important part of good stewardship of magnetic materials. New materials, without rare earths, were very popular. We heard about MnBi, NiFe and FeN. All have both promise of the future and challenges that must to be conquered, before they are ready for prime time.

My only lament is that we heard little from people who design devices using permanent magnets. Typically, this has been a very active and interesting part of the workshop, but

not this year. It would have been particularly interesting to hear from this constituency. My guess is that there have been herculean efforts over the past few years to reduce usage of dysprosium and neodymium in a wide variety of applications, mostly unpublished. It would have been enlightening to hear what people have done and to see how successful they have been in their efforts. Perhaps this omission reflects the views of the organizers and is a manifestation of the growing breadth of our industry, admittedly it can be difficult to cover everything. However, I hope that the organizers of future workshops will include more papers on applications, since it keeps us focused on how our materials are actually used, something we always need to keep in mind.

It was very nice to see so many young people at this workshop representing many universities all over the globe. They are very enthusiastic and excited about the technology and their future. For their sake and for our sake, I hope that the funding boom that we have enjoyed lasts just a little bit longer, so they will have the chance to move our technology forward.

And finally on a personal note, October 1st marks 40 years since I took up the study of rare earth permanent magnets as a graduate student with Dr. Chad Graham at the University of Pennsylvania. Then, we looked at the magnetic properties of SmCo5 in the form of single crystals and sintered bulk magnets. Ironically, Chad and I are paired again today, working on a solutions manual for his book “Introduction to Magnetic Materials.” As I always claim, we have only just scratched the surface in our use of magnetic materials. My hope is to keep scratching for a few more years.



About the Author - Dr. Stan Trout has more than 35 years’ experience in the permanent magnet and rare earth industries. Dr. Trout has a B.S. in Physics from Lafayette College and a Ph.D. in Metallurgy and Materials Science from the University of Pennsylvania. Stan is a contributing columnist for *Magnetics Business & Technology* magazine. Spontaneous Materials, his consultancy, provides practical solutions in magnetic materials, the rare earths, technical training and technical writing. He can be reached at strout@ieee.org.