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Presentation Title

Strategic materials relevant to permanent magnets and magnetic data recording

Abstract

All high-performance permanent magnets are currently based on NdFeB or Sm Co. Demand for these materials are currently running at about 80,000 tons per year and is set to increase with the advent of electric vehicles (about 3 kg per vehicle) and wind generators (about 700 kg per MW). Most critical are the heavy rare earth additives (Dy or Tb) required to provide the necessary temperature stability. It's unlikely that these strategic elements, many of them coming from unregulated mines in South China can be entirely dispensed with. Furthermore, the prospects of a rare earth free high performance magnet are even dimmer for reasons that will be explained. Nevertheless, opportunities exist 1) to reduce heavy rare earth content by grain boundary engineering but also to develop rare earth free magnets with energy products intermediate between those of NdFeB and ferrite, where there is a significant market opportunity.

Concerning magnetic recording, although quantities in individual memories or hard disks are very small, of order 10 μg , the need for Pt or Pd in alloys with the necessary perpendicular anisotropy might be regarded as alarming. However, prospects of finding replacement alloys which do not use such scarce elements are good. Some examples will be presented.