

# **Rare Earth Raw Materials for Polymer Bonded Magnets**

**Intertech**

**Polymer Bonded Magnets 2002**

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[www.spontaneousmaterials.com](http://www.spontaneousmaterials.com)

# Rare Earth Raw Materials for Polymer Bonded Magnets

- Out of the ground and to your door in six “easy” process steps
- Playing havoc with the market: allocations, imbalance, demand shift, oversupply and overreaction
- Some FAQ’s (frequently asked questions)
- Some QYSA’s (questions you should ask)
- The future: Better, worse or more of the same?

# What is a Rare Earth?

		Sc																	
		Y																	
		La																	

Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu

# Why are rare earths important?

Since the rare earths have attained commercial and economic importance, it would seem essential that we all possess some knowledge of these substances.

James F. Spencer  
1919

# Out of the ground and to your door in six “easy” process steps

- Mining/Resources
  - Where are the ores found?
  - What factors influence mining?
- Separation
- Fluoride
- Eutectic
- Alloy
- Rapid Solidification

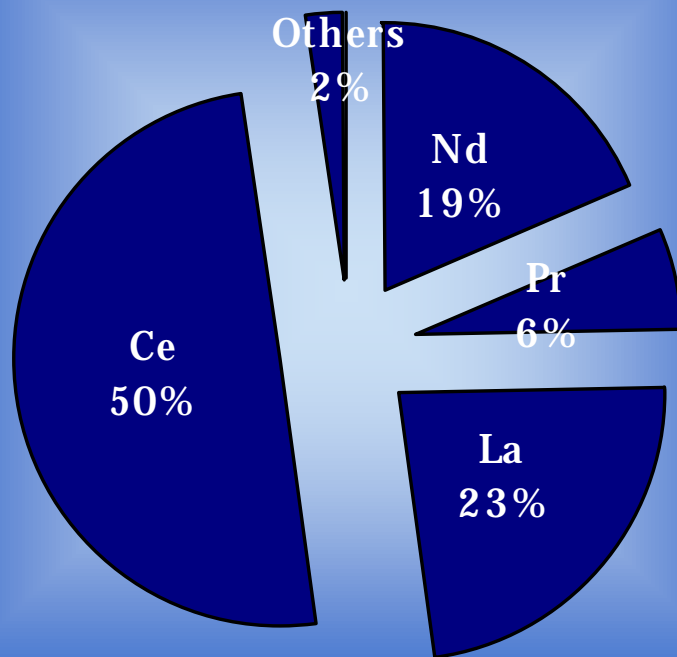
# Resources



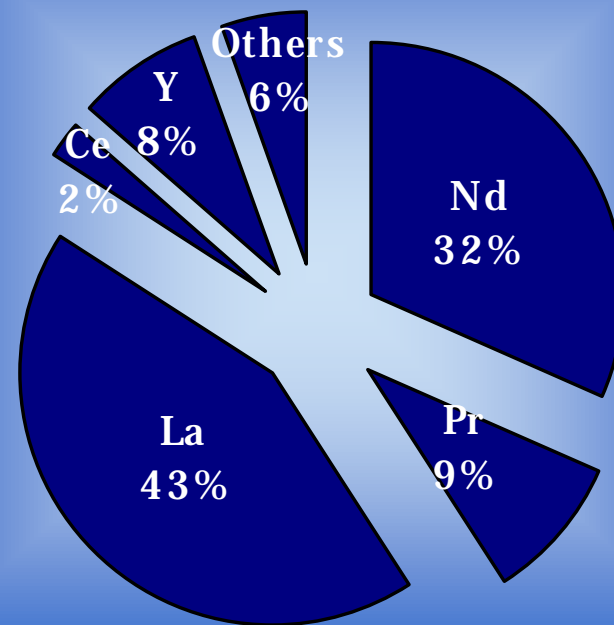
- China
  - Baotou
  - Ionic Ores
- Other sources
  - U.S.
  - Australia
  - India

# Common Ores

Bastnasite



Ionic Clay



# Out of the ground and to your door in six “easy” process steps

- Mining/Resources
- Separation
  - How is neodymium separated from the other rare earths?
- Fluoride
  - Why do we need fluoride?
- Eutectic
  - Finally, a metal!
- Alloy
  - Compositional adjustment
- Rapid Solidification
  - Creating the proper microstructure, developing magnetic properties



# Playing havoc with the market

- **Allocations**
  - Limit supply, a way to control prices
- **Imbalance**
  - What's popular, what's not popular
- **Demand Shift**
  - It's popular today. What about tomorrow?
- **Oversupply**
  - Too much of something no one wants
- **Overreaction**
  - If I cut my price, will you buy more?
  - Too much capacity, too soon

# **Some FAQ's**

**(frequently asked questions)**

- **I read that a new rare earth deposit was found. Will this cause the price of neodymium to drop immediately?**
- **Why don't prices vary precisely with abundance in the ore? (Why aren't air fares proportional to the distance traveled?)**
- **Why are rare earths so expensive?**
- **Why don't you just remove neodymium and leave the rest where you found it?**

# **Some QYSA's**

**(questions you should ask)**

- **What trends are driving your business these days? Do you expect them to continue?**
- **What rare earths are in short or excess supply? How might that change in the near term?**
- **Is there anything going on in other rare earth markets that will affect the price, supply or availability of neodymium?**
- **How do allocations affect your ability to supply neodymium?**

# The future: better, worse or more of the same?

- The Second Law of Thermodynamics
  - Chaos tends to increase over time, *unless we do work on the system.*
- What work?
  - Forecasting of demand and supply, the “transparent supply chain”
  - Understanding the drivers and working with them
  - Cooperation, keeping businesses healthy