Advanced Research Projects Agency • ENERGY

REACT PROJECT

CASE WESTERN RESERVE UNIVERSITY

IRON-NITRIDE ALLOY MAGNETS

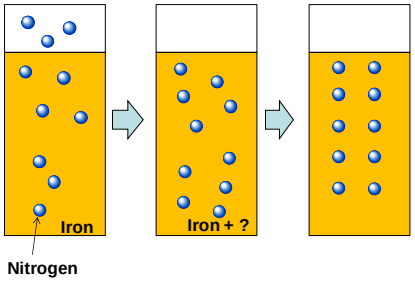
PROJECT TITLE:	Transformation Enabled Nitride Magnets Absent Rare Earths (TEN Mare)		
ORGANIZATION:	Case Western Reserve University (Case Western)	LOCATION:	Cleveland, OH
PROGRAM:	REACT	ARPA-E AWARD:	$1,000,000
TECH TOPIC:	Vehicle Technologies	PROJECT TERM:	1/1/12 – 6/30/13
WEBSITE:	www.arpa-e.energy.gov/ProgramsProjects/REACT.aspx		

CRITICAL NEED

Rare earths are naturally occurring minerals with unique magnetic properties that are used in electric vehicle (EV) motors and wind generators. Because these minerals are expensive and in limited supply, alternative technologies must be developed to replace rare-earth-based magnets in motors and generators. Alternatives to rare earths will contribute to the cost-effectiveness of EVs and wind generators, facilitating their widespread use and drastically reducing the amount of greenhouse gases released into the atmosphere.

PROJECT INNOVATION + ADVANTAGES

Case Western is developing a highly magnetic iron-nitride alloy to use in the magnets that power electric motors found in EVs and renewable power generators. This would reduce the overall price of the motor by eliminating the expensive imported rare earth minerals typically found in today's best commercial magnets. The iron-nitride powder is sourced from abundant and inexpensive materials found in the U.S. The ultimate goal of this project is to demonstrate this new magnet system, which contains no rare earths, in a prototype electric motor. This could significantly reduce the amount of greenhouse gases emitted in the U.S. each year by encouraging the use of clean alternatives to oil and coal.



IMPACT

If successful, Case Western would create iron-nitride magnets for electric motors that contain no rare earth minerals and could power an EV motor better than today's best commercial magnets.

- SECURITY: The U.S. produces a small fraction globally of industrial rare earths. Developing alternatives to the use of rare earths has potential to reduce our dependence on these materials and will have a positive impact on our national economic and energy security.
- ENVIRONMENT: The transportation and electric power sectors account for nearly 75% of U.S. greenhouse gas emissions each year. Better magnets would support the widespread use of EVs and wind power, significantly reducing these emissions.
- ECONOMY: The U.S. spends nearly $1 billion per day on imported petroleum. Improvements in magnet technology would enable a broader use of EVs, which would help insulate our economy from unexpected spikes in the price of oil.
- JOBS: Construction and manufacturing of renewable power facilities and EVs could create tens of thousands of jobs by 2030.

CONTACTS

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