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Influence of the particle size distribution of multiple-classified fine powders on the properties of recycled NdFeB sintered magnets

The energy transition towards sustainable mobility is essential to reducing CO_2 emissions and combating climate change. The global expansion of electromobility, the electrification of industry, and the use of wind energy will significantly increase the demand for high-performance NdFeB magnets. In addition to recent efforts to expand magnet production outside of China, recycling end-of-life magnets offers numerous advantages and has the potential to make a wide range of products more sustainable and to improve the resilience of critical rare earth elements supply.
The so-called short-loop or functional recycling approach based on hydrogen decrepitation (HD) was used on a pilot plant scale (up to 50 kg) to recycle End-of-Life (EoL)-magnets from wind turbines. The magnets were decrepitated under hydrogen and subjected to inline classifying after jet-milling to remove particles smaller than 1 µm which should reduce the tendency to oxidize during the recycling process. The inline classifying leads to a narrower particle size distribution and an improved D90/D10 ratio of 3.0 compared to 4.2 before classifying, and an increase in the D50 value from 5.8 µm to 6.2 µm. With the use of the classified powder, the oxygen content of the recycled magnets could be successfully reduced from 0.33 wt.% to 0.18 wt.%. The magnetic properties of the recycled magnets (Br = 1.29 T) outperform the EoL-magnet properties (Br = 1.27 T) and high squareness of 98 % is reached.

Professional Status of the Speaker

Senior Scientist

Interest in submitting a paper in a special issue of

No interest

Invitation letter for visa

No

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