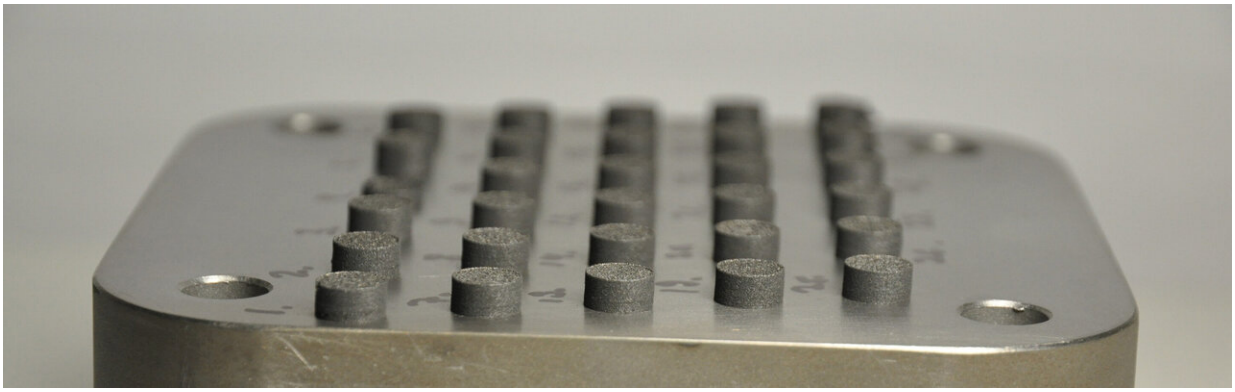
3-D-printed magnets help create more efficient electric motors

December 3 2020



Developed under the 3DREMAG project, these magnets were 3D-printed from Nd-Fe-B powder. Credit: VTT

VTT Technical Research Centre of Finland is leading a European consortium 3DREMAG which is developing a new material suitable for 3-D printing of permanent magnets, which can be utilized in electric and hybrid vehicle motors. The aim in the long run is to develop a fully 3-D printable electric motor, one that would be approximately 30% lighter than today's motors.

The new permanent magnet material being developed for this purpose will promote cleaner traffic and help reduce the environmental impact of traffic. Traffic is the world's second largest source of climate emissions and requires new sustainable solutions. By the end of 2020, the global

number of electric cars will exceed 10 million. Itis expected to reach 125 million by 2030.

More than 90% of electric vehicle motors are based on permanent magnets, which provide high power in small volume. Unlike electromagnets which require continuous electrical current in order to maintain their magnetism, permanent magnets do not require an external magnetic field. The strongest permanent magnets are based on a combination of neodymium, iron and boron (Nd-Fe-B).

Today, the production of fully dense permanent magnets is limited to simple shapes. The Nd-Fe-B powder developed under the 3DREMAG project will enable the production of magnets through 3-D printing. 3-D printing can be used to optimize the size of magnets and to improve resource efficiency. This is important because neodymium is a rare raw material with limited availability.

The powder under development is the first permanent magnet material customized for 3-D printing

Nd-Fe-B powder can be used to produce fully dense metallic and resource-efficient permanent magnets for electric and hybrid vehicle motors, electric bicycles and consumer electronics, as well as for wind turbine generators.

"In the long run, our goal is to construct a fully 3-D printable electric motor that would be approximately 30% lighter than today's motors. Achieving this goal requires multidisciplinary cooperation and combining different technologies," says Joni Reijonen, Research Scientist and Project Manager at VTT.

"This research project aims to implement complex, multilayered

structures for 3-D-printable permanent magnet components. It will enable new features such as segmentation and direct integration which increase the efficiency of electric motors. This solution can significantly enhance the conscious utilization of scarce materials," says Carsten Schuh, Head of the Siemens Technology Unit Functional Materials and Manufacturing Processes.

Provided by VTT Technical Research Centre of Finland

Citation: 3-D-printed magnets help create more efficient electric motors (2020, December 3) retrieved 9 April 2024 from https://techxplore.com/news/2020-12-d-printed-magnets-efficient-electric-motors.html

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.