

Super magnets from a 3-D printer

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The research team has now succeeded in producing miniaturised supermagnets using laser-based 3D printing. Credit: IMAT – TU Graz

Magnetic materials are an important component of mechatronic devices

such as wind power stations, electric motors, sensors and magnetic switch systems. Magnets are usually produced using rare earths and conventional manufacturing methods. A team of researchers at Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU) has worked together with researchers from the Graz University of Technology, the University of Vienna and the research institution Joanneum Research to produce specially designed magnets using a 3-D printer. The results were published in the journal *Materials*.

Permanent magnets are incorporated into a number of mechatronic applications. Traditional manufacturing methods such as sintering or injection molding are not always able to cope with increasing miniaturization and the resulting geometric requirements for magnets, and this is a trend which is sent to continue in the future. Additive manufacturing processes offer the necessary freedom of design.

The research team, involving Prof. Dr. Jörg Franke from the Institute for Factory Automation and Production Systems at FAU, has now succeeded in creating super magnets using laser-based 3-D printing. Metallic powder of the magnetic material is added layer by layer and the particles are joined by melting. The process allows magnets to be printed with a relatively high density at the same time as controlling their microstructure. This allows researchers to tailor the magnetic properties to suit the required application exactly.

More information: Mateusz Skalon et al, Influence of Melt-Pool Stability in 3D Printing of NdFeB Magnets on Density and Magnetic Properties, *Materials* (2019). [DOI: 10.3390/ma13010139](https://doi.org/10.3390/ma13010139)

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