

# Toshiba develops dysprosium-free samarium-cobalt magnet to replace heat-resistant neodymium magnet

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Toshiba Corporation announced today that the company has developed a high-iron concentration samarium-cobalt magnet that is free of dysprosium, a rare earth mineral that is in extremely short supply and increasingly expensive. At typical operating temperatures, the samarium-cobalt magnet has superior magnetic properties to the heat-resistant neodymium magnets currently used in motors.

The traction motors for hybrid and electric automobiles, railroad vehicles, and the motors for industrial equipment operate at relatively [high temperatures](#), and heat-resistant neodymium magnets are generally used in these applications. However, [dysprosium](#) is a key material of these magnets. Current sources of dysprosium are limited, and recent export limitations and price rises are raising global concerns for future shortages. In these circumstances, the development of dysprosium-free high performance magnets that offer a strong magnetic force at high operating temperatures is an important objective for the industry.

Toshiba has used heat-treatment technology to improve the magnetic force of the samarium-cobalt magnet, and in doing so, has boosted its performance to a level surpassing that of the heat-resistant neodymium magnet. The high-iron concentration samarium-cobalt magnet exceeds the heat-resistant neodymium magnet in magnetic force by 1% at an operating temperature of 100°C by, and 5% at, 150°C. Toshiba achieved this by reducing the oxide and the phase with high copper concentrations

in the magnet, both of which inhibit [magnetic force](#), and by increasing the amount of iron in the magnet from 15% to 20% by weight.

Toshiba has verified the performance of the new magnet when applied in motors for automobiles, locomotives, machine tools and elevators, confirming that it has almost the same capabilities as heat-resistant neodymium magnets of the same size. The magnet is highly suited to motors that must combine high heat resistance with high performance and a small size.

The company aims to start mass production of the magnet at the end of the current fiscal year and promote its use in all applicable equipment.

Provided by Toshiba Corporation

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