

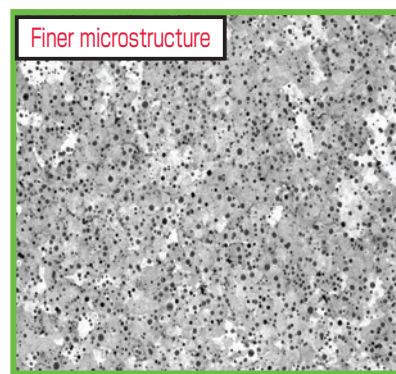
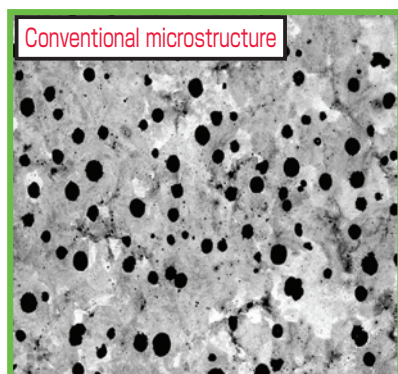
Name of Technology	Ultrafine-structure high-strength cast iron	Metal
Name/Post/Faculty	Visiting professor Hiroshi Horie / Technical Officer Toshinori Kowata, Foundry Engineering, Department of Materials Science and Engineering, Faculty of Engineering	
Key words	spheroidal graphite cast iron, high strength, rare earth, manganese, copper	

What kind of technology is this?

Outline

We have succeeded in achieving the world highest mechanical properties (in terms of tensile strength and elongation) by changing the microstructure of cast iron to ultrafine microstructure.

This study aims to develop a spheroidal graphite cast iron whose strength is 900 MPa, or higher which exceeds the existing JIS's maximum strength 800 MPa, by significantly lowering the microstructural size of nodular graphite cast iron that is used today as the material of various automobile components. In this cast iron, the reduction of the microstructural size of graphite was achieved by adding rare earth elements (RE), of which amount stoichiometrically corresponded to the amount of sulfur (S) contained as impurity in the cast iron, into the molten cast iron. In addition, the increase of its strength was achieved by adding alloying elements such as manganese (Mn) and copper (Cu) to the cast iron, which led to the reduction of the microstructural size of base microstructure.



Tensile strength: 900 - 1200 MPa
Elongation: 4 - 6%
Pearlitic layer interval: 0.5 - 0.2 μm

What are its applications?

This cast iron can be used for car's engine related components and brake components that require high strength. If this cast iron is used for car components, it will contribute to the improvement of fuel consumption due to its lighter weight, with an expectation of lowering the environmental burden.

Related patents	Japanese patent No. 4140046
Related materials	Journal of Japan Foundry Engineering Society, Vol. 75, No. 5, 331-336 (2003) Journal of Japan Foundry Engineering Society, Vol. 76, No. 10, 830-836 (2004)