Mitsubishi Electric Develops Advanced Manufacturing Technology for Boron-carbide Diaphragms Used in Hi-fi Loudspeakers

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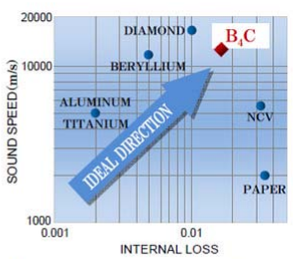
Unprecedented sound speed delivers improved loudspeaker performance

Mitsubishi Electric Corporation (TOKYO: 6503) announced today it has developed an advanced technology for manufacturing boron-carbide diaphragms used in hi-fi loudspeakers, applying an optimal diaphragm build-up method to realize the fastest sound speed of any commercially available boron-carbide diaphragm, resulting in improved sound quality. Mitsubishi Electric will apply its new technology in home and automotive acoustic products and audiovisual systems.

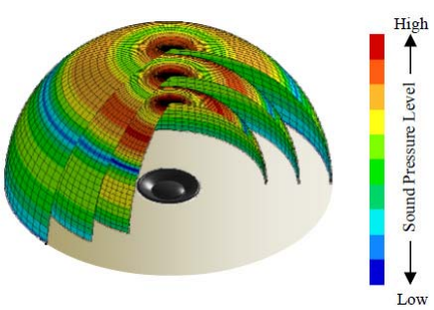
Boron-carbide diaphragm made with Mitsubishi Electric's new technologies



Materials internal loss and sound speed in a loudspeaker diaphragm

Boron-carbide diaphragms made with this new technology reproduce sound at 12,700 meters per second (m/s), compared to less than 12,000 m/s in existing loudspeakers incorporating boron-carbide diaphragms.

Mitsubishi Electric adopted a pressure-less sintering method, developed originally for ceramics manufacturing by Mino Ceramic Co. and Japan's National Institute of Advanced Industrial Science and Technology. The company used acoustic analysis technology to design an optimum shape for a boron-carbide diaphragm. These two technologies realize reproduction of sound similar to the original one.



Example of acoustic analysis for loudspeaker

Loudspeaker sound quality is highly influenced by the diaphragm, the part that transmits sound vibrations through the air. Ideally, the diaphragm should offer a combination of high sound speed and moderate internal loss. High sound speed helps to transmit complicated vibrations, from low- to high-pitched tones, similar to those of the original sound. The only three materials used in commercial diaphragms that offer theoretical sound speeds above 10,000 m/s: are diamond – 17,000 m/s, boron carbide – 13,400 m/s and beryllium –11,500 m/s.

Moderate internal loss helps to deter resonant vibration after the original sound signal stops. Insufficient loss results in audible resonance, whereas too much loss inhibits the production of rich tones. Boron carbide offers the best balance of moderate internal loss and high sound speed. Since 1989, Mitsubishi Electric has been the only company to produce loudspeaker systems with boron-carbide diaphragms.

Mitsubishi Electric combines extensive know-how encompassing materials and structure design to produce a wide range of original diaphragms for its DIATONE series of loudspeaker systems. In 2010, the company announced a new resin material, Nano Carbonized