Development of production technology for large-area single crystalline diamond wafers

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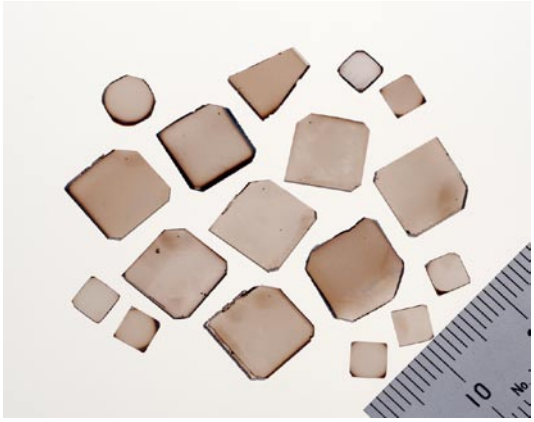
We have successfully developed a process which can fabricate a number of large diamond wafers from single seed crystal. This process, called "Direct Wafer-Making Technology", is a combination of high rate growth process using microwave plasma CVD and subsequent etching process of graphitized ion implanted layer in the seed. Using this process, 10 mm square, self standing, single crystalline CVD diamond wafers can be synthesized. These large diamond wafers will be essential for future electronic devices which utilize excellent properties of diamond as semiconducting material.



10 mm square single crystalline CVD diamond wafers

Micro SOFC with high output performance

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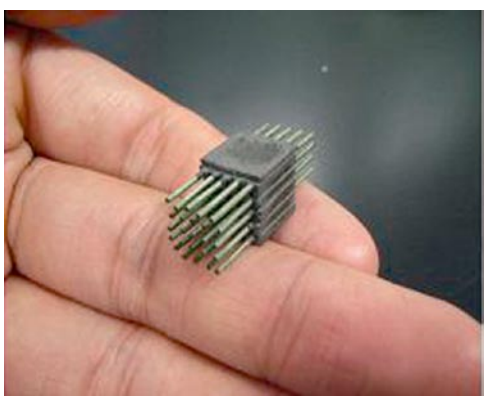
A micro tubular SOFC (Solid Oxide Fuel Cell) bundle (cube) whose volume is 1 cm^3 was fabricated using a newly-developed advanced ceramic processing technology. The cube consists of micro tubular SOFCs and cathode matrices which act as a current collector and provide gas flow paths for air. The performance of the cube was shown to be over 2 W at 550 °C with H_2 fuel. Currently, a fabrication technology of micro SOFC stacks by integrating these cubes is under development, aimed for the output performance of several W to kW scale with quick start-up/shut-down performance. They are expected to be applied to portable power sources, APU units for automobiles.



Micro SOFC cube.