INNOVECTIS
Ein Unternehmen der
Johann Wolfgang Goethe-Universität
Frankfurt am Main

Micro-diamond synthesis – a revolutionary new approach

Project Status

- Method and prototype show promising results
- Technology ready for tests in an industrial environment

Customer Benefits

- Lower costs of synthetic diamond production due to only 5-7GPa pressure and 1200-1300°C temperature
- Much faster (<< 1day) reaction compared to established methods
- No seed crystal needed and no metal impurities
- Method compatible to existing high-pressure-high-temperature methods

Patents

- European priority patent application has been filed in October, 2018

  EP 18203509

Offer

- The technology can be licensed or assigned
- Collaborations regarding further development are welcome

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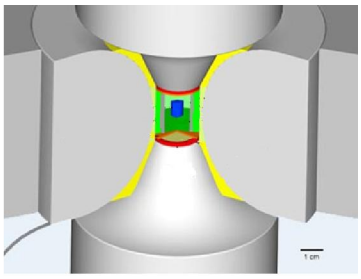
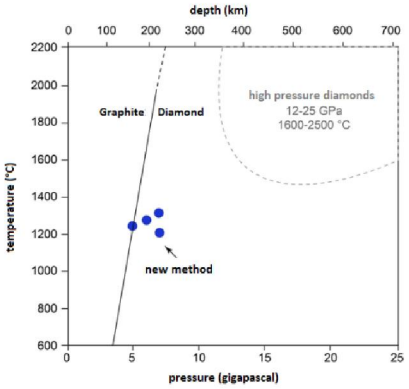
Abstract

Scientists from Goethe University Frankfurt am Main developed an new method for micro-diamond synthesis.

The method facilitates diamond formation at much lower pressure and temperature compared to established procedures. Multiple successful experiments showed the crystallization of diamonds after only 6-15hours at 5-7GPa and 1200-1300°C. These parameters are remarkably lower compared to other industrial applicable methods. In addition the diamonds form without the need of a seed crystal and contain no metal impurities.





Apparatus for diamond synthesis and pressure-temperature graph that shows the parameters needed for the synthesis of high-purity diamonds.

Invention

The basic idea about the method is the usage of a carbon-containing fluid instead of graphite for diamond synthesis. Special inner and outer capsules together with an adapted pressure medium have been developed that successfully resolve occurring issues using a fluid medium as starting material instead of a solid, e.g. the stabilization of hydrogen fugacity and inhibition of hydrogen exchange

The composition of the carbon-containing fluid, the selection of involved high-pressure materials as well as the pressure and temperature parameters have been carefully optimized to produce a remarkable amount of synthesized micro-diamonds.