

Development of Efficient Biogas-Powered 6 kW Gas Engine Cogeneration System

The Institute for Energy Utilization, a division of the National Institute of Advanced Industrial Science and Technology, in cooperation with Aisin Seiki Co., Ltd. (Aisin Seiki), has made improvements to the production model of a compact, highly efficient, city gas-powered 6 kW gas engine cogeneration system manufactured by Aisin Seiki. The 6-kW gas engine cogeneration unit was successfully operated using a low-calorific-value model biogas. This system is being viewed as a new means of establishing small-scale biogas-powered plants at livestock farms, sewage sludge treatment plants, and other biogas plants.

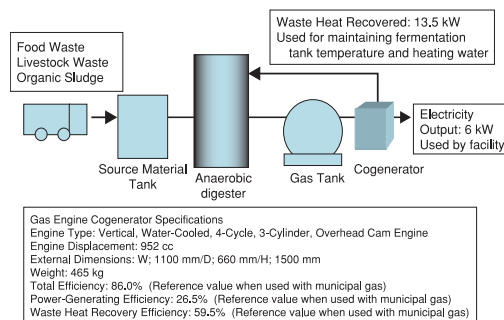


Diagram of efficient biogas-powered 6 kW gas engine cogeneration system

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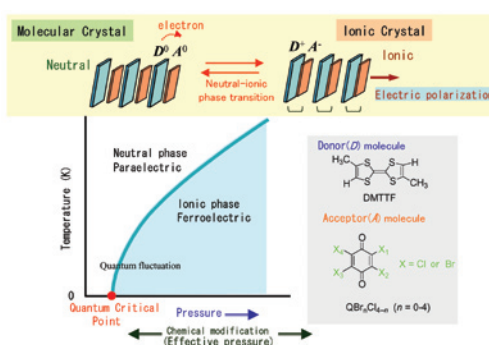
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Nanotechnology and Materials Science & Technology

Discovery of Quantum Phase Transition in Organic Crystal

- Transformation of crystal binding at absolute zero temperature -

By reducing the phase transition temperature to close to absolute zero, we have achieved quantum fluctuation (tunneling) between two states of different crystal binding—molecular crystals and ionic crystals—in a single organic substance (a charge-transfer complex). The molecular charge (crystal binding) and dielectric polarization simultaneously fluctuate at close to absolute zero temperature and the findings represent a new type of quantum phase transition. We can expect that the accurate control by use of both pressure and chemical modification is a useful method for the further development of new materials with diverse functionality, including non-linear optics and switching using light, electric field, current, etc.



Temperature-pressure phase diagram and scheme of crystal transformation

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