

The Osaka Gas Group has positioned research and development as an important means for enhancing competitiveness in both the energy and non-energy businesses, and has pursued constant innovation while maintaining speed and flexibility in its implementation. We are selective in the fields of R&D and are focusing on those areas that enhance the Group's market position. The Osaka Gas Group concentrates its resources on furthering its core technologies and increasing efficiency in research and development activities.

Core Technologies Help Create World-Class Gas Reformers

Osaka Gas has cultivated its core technologies through research and development based on a wealth of technological expertise accumulated since the days when gas was manufactured from coal. We have successfully developed carbon fibers and mesocarbon microbeads (MCMB) for various applications, and are currently working on the development of catalysts, carbon nanotubes and fluorene.

In catalysts, we are developing environment-related catalysts for use in cleaning exhaust gas and wastewater treatment, as well as energy conversion catalysts for the extraction of hydrogen from natural gas. Osaka Gas developed natural gas reformers using this energy conversion catalyst (reforming catalyst). The reformer extracts hydrogen from natural gas to use as an energy source for fuel cells. The new equipment performs at world-class levels both in terms of carbon monoxide removal and operation time. Based on this gas reforming technology, the Company aims to commercialize fuel cells by the fiscal year ending March 31, 2006, through internal development and by sharing technologies with leading companies in Japan and around the world.

Turning Carbon Materials Technologies into Businesses

Carbon nanotubes, a new material representative of nanotechnology, is created by adding high value to gas by-products emitted while coal is refined into gas.

The carbon nanotubes Osaka Gas developed in May 2002 feature the world's first amorphous construction for side walls, which have high hydrogen adsorption capacity. Carbon nanotubes are expected to contribute to the commercialization of fuel cells as a material for storing hydrogen. Carbon nanotubes are also expected to be used in a wide variety of applications, ranging from electron-emitting materials, sensors and electrically conductive materials to a replacement to silicon for semiconductor materials and integrated circuits.

The Company aims to expand the fluorene business as a carbon-based materials technology. Fluorene derivatives are attracting attention for their high refraction rates and thermal durability as an optical material for digital video camera lenses and LCD-related components. Sales of fluorene derivatives reached approximately ¥0.7 billion in the fiscal year ended March 31, 2003. The Company aims to improve the profitability of the materials business, and in December 2002 estab-

lished OnFine Co., Ltd. as a joint-venture LCD-related material sales company with Nagase & Co., Ltd.

Bolstering the Energy Business with Technological Development

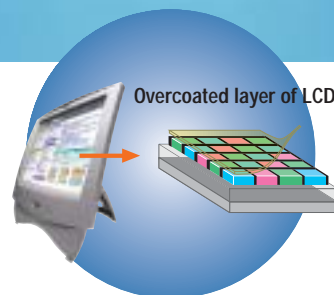
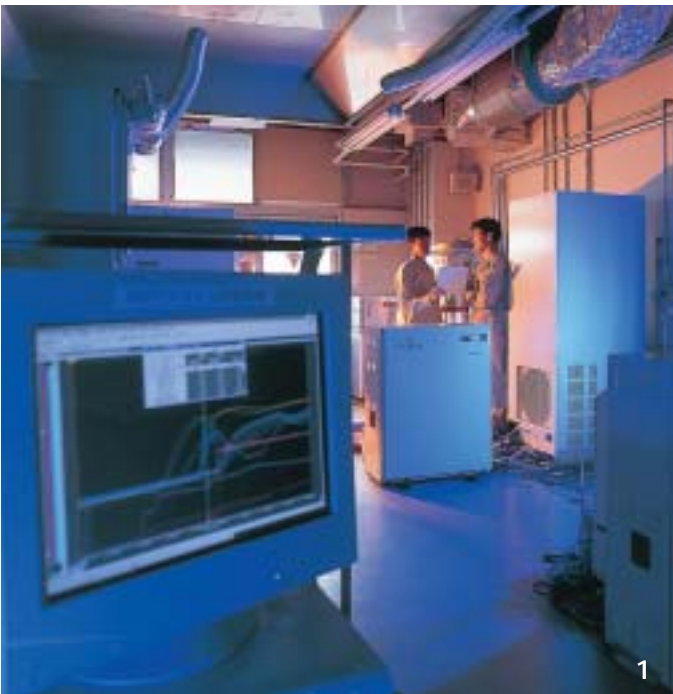
Using our core technologies and product development capabilities, we aim to strengthen technological development capabilities that contribute to better safety, services, efficiency and sales in the energy business.

In the gas business, Osaka Gas is advancing research and development that contributes to higher sales in gas operations, such as the commercialization of residential and industrial gas engine cogeneration systems, higher efficiency in cogeneration systems, and higher efficiency in gas heat pumps (GHP). In the LNG and pipeline fields, Osaka Gas strives to reduce costs by using maintenance and diagnostic technologies. In areas related to the electric power business, the Company is focusing efforts on the development of an electricity supply control system to comprehensively manage distributed power sources, including the Company's power generation facilities and cogeneration facilities installed at customers whose excess power is subject to retailing.

In environmental operations, Osaka Gas aims to expand its market share in the biogas power generation field by strengthening technologies related to biogas engines that use cogeneration, gas processing and catalyst technologies, all areas of expertise for the Company.



This gas engine incorporates compressed auto-ignition technology.



1: Development of polymer electrolyte fuel cell (PEFC)

2: Fluorene derivatives and polyceran (above)
Application of fluorene derivatives (below)

3: Mesocarbon microbeads used in negative electrodes for lithium-ion batteries for mobile phones

4: Structure of carbon nanotubes

