

The 7th Green and Sustainable Chemistry Award

Awarded by the Minister of Education, Culture, Sports, Science and Technology

Kazuko Ogino

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Contribution to Education and Dissemination of Green & Sustainable Chemistry

Green & Sustainable Chemistry (GSC) is defined as "Chemical technologies to realize the human and environmental health, minimization of energy and resource consumption". To promote GSC, science education is essential. However, the attitude of students to science is of severe concern in Japan. Some students are not well motivated to study science.

Professor Ogino (the awardee) has been engaged in pioneering activities of the education and dissemination of GSC in high schools, colleges, academic societies and GSC Network. The awardee has been striving to nurture students positive attitude toward science and technology through the study of GSC. Some of the activities of the awardee are described below.

1. Development, Promotion and Dissemination of Microscale Chemistry (MC) Experiments:

Microscale Chemistry is performed by using drastically reduced amounts of chemicals and miniature labware. The general advantages of MC is the reduction of environmental impacts (reduction of energy, chemicals, wastes), and the improved laboratory safety. Even some explosion experiments can be carried out safely in MC, which are not allowed in ordinary scale experiments. In MC, students can experience various reactions by themselves. The awardee has developed many attractive MC experiments and proposed to teach GSC through MC. It is effective in nurturing students' interest toward science, in enhancing reliability of science and technology. She has organized many workshops in and outside Japan to popularize MC and GSC. She also organized a group of researchers to investigate MC-GSC education. For example, *Microscale Chemistry as an Approach to Green Chemistry in Academia*, and *Development of Teaching Materials Incorporating the Concept of Green Chemistry and Design of Experiments to Promote Creative Thinking* were funded by Grant-in-Aid for Scientific Research

2. Activities in Tohoku Association of Chemical Education:

The awardee has been leading Tohoku Association of Chemical Education, organized by several college and high school teachers, to study GSC and exchanging information on GSC technologies. It has contributed much to the dissemination of GSC education.

3. Textbook on GSC:

Professor Ogino is one of the editors of the book *Chemistry and Environment: Introduction to Green Chemistry*. The main issues in this book are: Chemistry is indispensable in understanding environmental problems; Chemists are working to improve the quality of air, water, *etc.* and to protect environment. Chemists

are working to find new and innovative methods for making many useful and environmentally benign products.

- 4. International Activities:** The awardee has regarded international exchange important, and has advocated the importance of GSC in many international conferences. For example, in Pacificchem2000, she organized the largest symposium on GSC education till then, invited many prominent researchers including P. Anastas, and succeeded in sharing ideas and experiences, emphasizing the benefits of implementing GSC and MC into education.