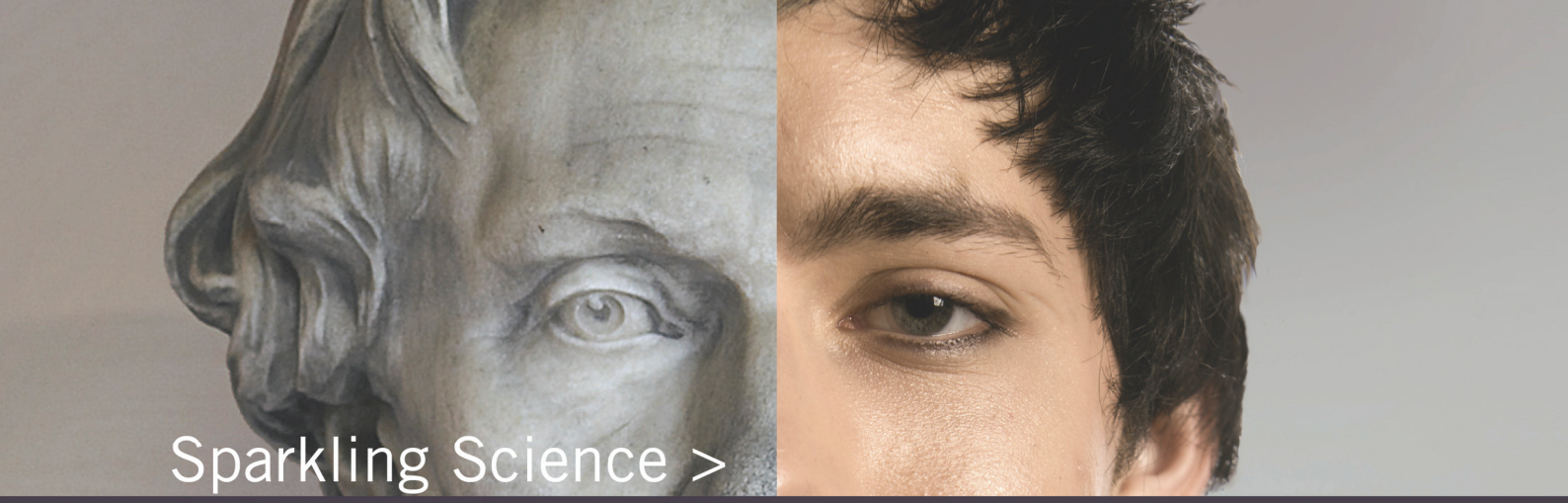

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Interim Report, May 31st 2009

Research and Education Cooperation
GREEN CHEMISTRY

LEADING INSTITUTION
Vienna Univ. of Technology, Faculty of Techn. Chem.
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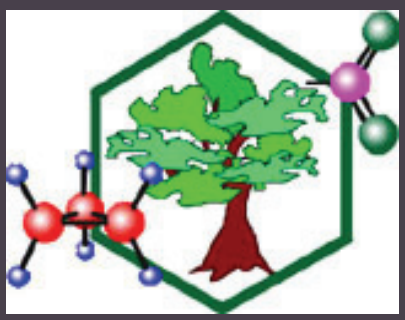
SCIENTIFIC CO-OPERATION PARTNER
Analytic Center IFA Tulln (BOKU Wien)

SCHOOLS INVOLVED
Gymnasium & Realgymnasium Sachsenbrunn, Lower Austria
GRg17 Parhamergymnasium, Vienna
BG/BRG St. Veit an der Glan, Carinthia
Wiedner Gymnasium – Sir Karl Popper Schule, Vienna
HTL Rosensteingasse, Vienna
BRG Feldkirchen, Carinthia
BG/BRG Villach, Carinthia
Technologisches Gewerbemuseum TGM, Vienna
BG/BRG Wenzgasse, Vienna
BG/BRG 11 Geringergasse, Vienna
GrgXI Gottschalkgasse, Vienna
BG/BRG Tulln a.d. Donau, Lower Austria
BG/BRG Fichtnergasse, Vienna
BRG Kandlgasse, Vienna
BG/BRG Hagenmüllergasse, Vienna
HTL Dornbirn, Vorarlberg



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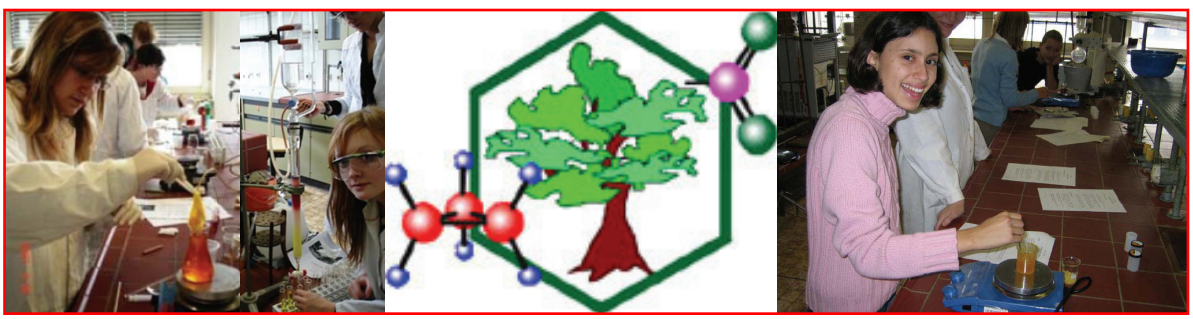
Green Chemistry @ Sparkling Science

Chemistry smokes and stinks – the cooperative project *Green Chemistry* attempts to change this cliché by raising interest in environmentally benign and sustainable technologies already among high school students. It is a dedicated goal of this initiative to enable participation of pupils with an advanced educational level within ongoing research programs at academic institutions. This aims at fostering independent contributions by pupils to ultimately allow for the compilation of high end student project reports (*Fachbereichs-* & *Diplomprojektarbeiten*).

The *Green Chemistry* program offers a variety of laboratory courses during the summer months at sites of Vienna University of Technology and ITA-Tulln. Pupils can participate in small groups (1-3 fellows) in order to conduct independent scientific experiments within a predefined thematic range. During the following study year candidates are expected to compile, evaluate and interpret the results in a cooperative effort between pupils, teachers and university instructors, to generate a comprehensive report. It is a particular deliverable of the project to provide support to pupils in the compilation of a formal student project report (*Fachbereichsarbeit*), which is composed by the fellows on their sole responsibility. The following thematic areas are covered by activities within *Green Chemistry*:

- Alternative energy forms and modern chemical reactors
- Renewable resources and biomaterials
- Bioorganic chemistry and white biotechnology
- Modern catalysis
- Chemistry in food safety and environmental chemistry
- Alternative reaction environments

During the first round of experimental courses twelve discrete projects (out of a list of 19 proposals) were elaborated by 22 fellows originating from schools in three Austrian provices. Eleven Candidates produced reports compatibly with the standards of *Fachbereichs-* or *Diplomprojektarbeiten* (at HTLs). Out of these two theses received awards (Borealis Innovation Award for Pulka/Steyrer, 1st prize of the chemistry teacher association for Werbach), additional reports were presented to a broader audience (open house day at the ministry of science / Kampichler; Vienna Knowledge Space – Science Café / Kampichler, Klösch, Karl; publication “Sparkling Science Maturaarbeiten” / Pichler).



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During the course of the first project year the following topics were successfully implemented (among others):

Biodegradable Plastics for Medicinal Applications: Due to the extended life expectance and the resulting larger number of injuries and sicknesses there is an increasing need for materials for temporary tissue replacement and support until completion of the healing process. Modern methods in rapid prototyping such as stereolithography enable the preparation of the required cellular structures in high resolution. Within this project novel substitute materials for bones were developed. The program included synthesis, mechanical and cell biological characterization, as well as 3-dimensional structuring by applying rapid prototyping.

Electrochemical Processes for Fuel Cells & Sensors: Electrochemistry enables chemical reactions upon applying voltage; the measurable current indicates the reaction velocity. Within the project the speed of oxygen reduction at various materials was studied utilizing electrochemical measurements by microelectrodes. This process is critical both in fuel cells (these are highly efficient and novel types of batteries) as well as in sensors for gases (as applied in modern cars).

Synthesis of Electroluminescent Olighotiophenes: Organic electronics is a novel research field investigating the conductivity of organic compounds. Organic light emitting devices (OLEDs) are of particular interest, as they are tentatively cheap devices for displays (screens, cell-phones etc.). In course of this project novel compounds were synthesized and characterized, which represent promising precursors for the production of OLEDs.

Novel Biofuel-Additives from Carbohydrate Sources: Currently promoted biofuels like bioethanol and biodiesel are considered increasingly problematic based on the immediate competition to agricultural food production, hence, resulting in a number of economic and ethical issues. This project was dedicated in the evaluation of organic wastes to be utilized for the production of fuel additives.

Catalytic Hydrodechlorination at Bimetallic Catalysts: Organic chlorides originating from the metallurgy industry and potentially leading to soil contamination were degraded upon catalytic hydrodechlorination in a reductive process. The transformation was conducted using hydrogen that was activated at a transition metal catalyst. In order to decrease the strong reducing power of such transition metals and to allow access to additional value products a second metallic species is often used for making a blend. In the course of this project diverse bimetallic catalysts were prepared, characterized, and tested for the above reaction.

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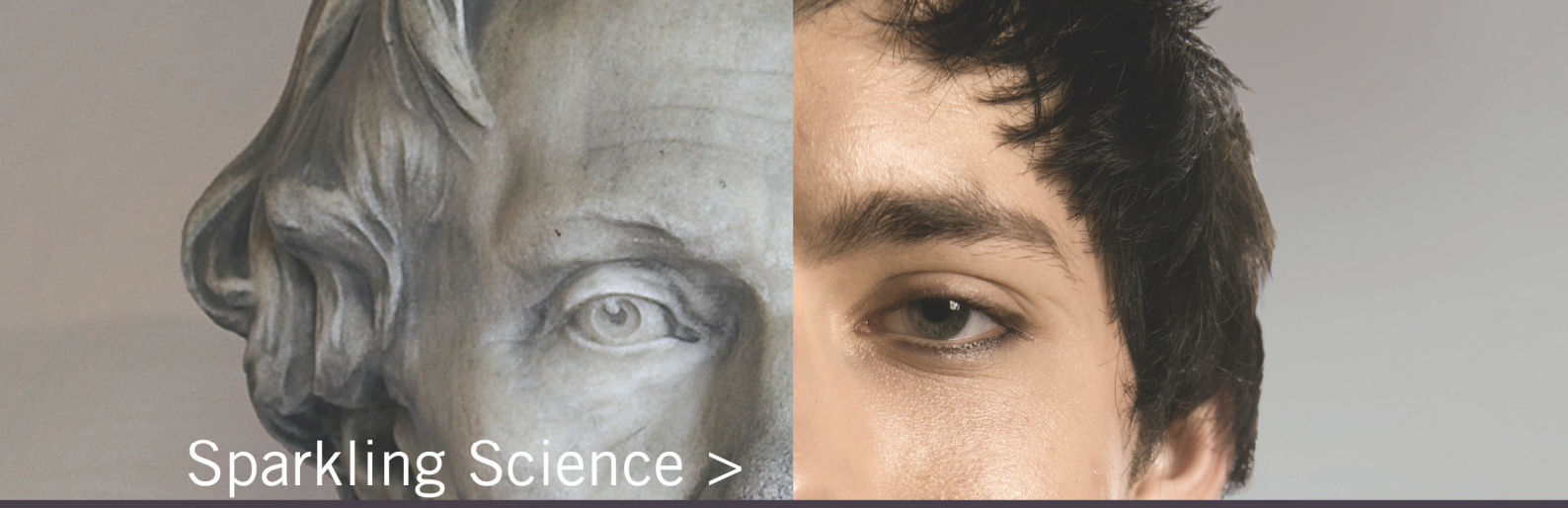

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