KENNETH G. HANCOCK MEMORIAL
STUDENT AWARD IN GREEN CHEMISTRY
Student Application Package
Award: $1,000
Closing date: October 9, 2020

The Kenneth G. Hancock Memorial Award is sponsored by the American Chemical Society (ACS) Division of Environmental Chemistry and the U.S. Department of Commerce, National Institute of Standards & Technology (NIST). The award is administered by the ACS Green Chemistry Institute®.

Questions about the Hancock Memorial Award should be directed to the ACS Green Chemistry Institute®, phone: (202) 872-6102; email: gci@acs.org.
Background
Green chemistry, or environmentally benign chemical synthesis and processing, is an integral component in meeting national sustainable development and pollution prevention goals and objectives. One of the architects of the ‘Environmentally Benign Chemical Synthesis and Processing’ approach was Dr. Kenneth G. Hancock, Director of the Division of Chemistry at the National Science Foundation (NSF). Dr. Hancock was an active advocate who emphasized the role of chemists and chemistry in solving the environmental problems of the past, as well as avoiding environmental problems in the future, in an economically viable fashion.

It was a great loss to the advancement of green chemistry when Dr. Hancock died unexpectedly while attending an environmental chemistry conference in Eastern Europe in 1993. To honor his contributions in the field of green chemistry, Dr. Hancock’s colleagues from academia, government, and industry established the Kenneth G. Hancock Memorial Student Award in Green Chemistry, offered under the auspices of the American Chemical Society (ACS) Division of Environmental Chemistry. The Hancock Memorial Award is presented annually in conjunction with the ACS GCI’s annual Green Chemistry & Engineering Conference.

Description
ACS President Dr. Paul Anderson announced the Hancock Memorial Award in June 1997 as an opportunity for undergraduate and graduate students to compete for a prestigious award in recognition of their studies and/or research in green chemistry. The award provides national recognition for outstanding student contributions to furthering the goals of green chemistry (i.e., the research, development, and implementation of fundamental and innovative chemical technologies that incorporate the principles of green chemistry into chemical design, manufacture, and use, and that have the potential to be utilized in achieving national pollution prevention goals). A second annual award, sponsored by the National Institute of Standards and Technology, was added in 2007.

Terms of the Award
The Hancock Memorial Award is a one-time cash prize in the amount of $1,000 and a $1,000 travel stipend to offset costs of transportation, lodging, and registration fees to attend and present at the Green Chemistry & Engineering Conference. The award is open to all undergraduate and graduate students, regardless of citizenship or country of study. One or two awards are typically given annually. This application package contains concise instructions on how to apply for the award. Applications must be received by 5:00 p.m. EDT (GMT-4), October 9, 2020. An independent panel convened by the ACS Green Chemistry Institute® will judge applications received for the award. The award will be presented at the 25th Annual Green Chemistry & Engineering Conference, held June 14-16, 2021 in Reston, VA. The Hancock fellow must give an oral or poster presentation during the conference as well as submit a report to ACS GCI on his/her experience after the conference in order to receive reimbursement. If two Hancock Awards are given in one year, one of the awards will be given to an undergraduate student and the other to a graduate or post-graduate student (a recent graduate who completed his/her graduate degree after May 1, 2020).
Award Scope and Objectives
Green chemistry is defined as the use of chemistry for source reduction, the highest tier of the risk management hierarchy as described in the Pollution Prevention Act of 1990. More specifically, green chemistry involves a reduction in, or elimination of, the use or generation of hazardous materials—including feedstocks, reagents, solvents, products, and byproducts—from a chemical process. Green chemistry encompasses all aspects and types of chemical processes, including synthesis, catalysis, analysis, monitoring, and separations and reaction conditions that reduce impacts on human health and the environment relative to the current state of the art.

Applications for the Hancock Memorial Award must describe studies or research that the student has participated in, which address the scope and objectives of green and sustainable chemistry and/or engineering. The activity should address one or more principles of green and sustainable chemistry and/or engineering (https://www.acs.org/content/acs/en/greenchemistry/principles.html) and, more specifically, that address one or more of the following three green chemistry focus areas:

Focus Areas

1. The use of greener synthetic pathways. This focus area involves designing and implementing a novel, greener pathway for a chemical product. Examples include synthetic pathways that:
   - Use feedstocks that are of lower inherent hazard to humans or the environment, and/or that are renewable (e.g., biomass, natural oils)
   - Use novel reagents or catalysts, especially those that use earth abundant metals, organocatalysts, biocatalysts, and microorganisms. Precious metal (i.e., Pt, Pd, Ru, Rh, Ag, Os, Ir, Au) containing catalysts at concentrations greater than 10 ppm are strongly discouraged unless these are heterogeneous and greater than 95% recyclable.
   - Are natural processes, such as fermentation, or use biomimetic processes
   - Are atom- and/or step-economical
   - Are convergent syntheses

2. The use of greener reaction conditions. This focus area involves improving conditions other than the overall design or redesign of a synthesis. Greener analytical methods often fall within this focus area. Examples include reaction conditions that:
   - Replace hazardous chemicals (starting materials, reagents, etc.) and solvents with chemicals and solvents that have a lower impact on human health and the environment.
   - Use solvent-less reaction conditions and solid-state reactions
3. The design of greener chemicals. This focus area involves designing and implementing chemical products that are less hazardous than the products or technologies they replace. Examples include chemical products that are:
   - Less hazardous (environmental, health and safety) than current products
   - Inherently safer with regard to accident potential
   - Recyclable or biodegradable after use
   - Safer for the environment (e.g., do not deplete ozone or form smog)

Selection Criteria
The selection criteria used to judge applications received for the Hancock Memorial Award are similar to those used for the Green Chemistry Challenge Awards. The criteria were designed to ensure that award recipients are furthering the goals of green chemistry and/or green engineering. The Hancock Memorial Award selection criteria are as follows:

1. The student activity must meet the scope and objectives of the award and address one or more of the focus areas.
2. The student activity should offer potential human health and/or environmental benefits. The activity should further a technology that might, for example:
   - Reduce toxicity (acute or chronic) or the potential for illness or injury to humans, animals, or plants
   - Reduce flammability or explosion potential
   - Reduce the use or generation of hazardous substances, the transport of hazardous substances, or releases to air, water, or land
   - Improve the use of natural resources, for example, by substituting a renewable feedstock for a petrochemical feedstock
3. The student activity should be potentially applicable to a large and broad-based segment of academia, industry, or society at large. The activity should further a technology that is, for example:
   - A practical, cost-effective approach to green chemistry
   - A remedy for a real environmental or human health problem
   - Readily transferable to other academic institutions or industry sectors
4. The student activity should be innovative and of scientific merit. The activity should be, for example, original (i.e., never before investigated, researched, or employed) and scientifically valid.
How to Apply

Applications should be written by the student applicant and submitted as a single PDF file. Applications must be no longer than eight, 8½-by-11-inch pages, written in font no smaller than 11 point, with margins of at least 1 inch. Applications longer than eight pages total will not be accepted. The application should include the following:

1. A one-page cover sheet with the complete names, addresses, telephone numbers, and e-mail addresses (if available) of the following individuals:
   - The undergraduate or graduate student applicant
   - The primary sponsor (academic institution and project advisor)
   - Contributors (individuals or organizations that provided financial or technical support for the student activity)
   - Contact person – person who is responsible for all communications with the program (the student or advisor)

2. The cover sheet should be followed by a background section (no more than one page) containing the following information:
   - For undergraduate applicants: type of degree expected (B.A., B.S. or Associate), major and any minor fields of study, and the month and year the degree is expected
   - For graduate applicants: type of degree expected (M.S. or Ph.D.), field of study, number of years already spent pursuing graduate work, and the month and year the degree is expected. **Students who completed their Ph.D. prior to May 1, 2020 are not eligible for the award.** In addition, graduate applicants must provide their undergraduate institution, type of degree earned, major and any minor fields of study, and the month and year their undergraduate degree was awarded.
   - Current undergraduate or graduate grade point average. In addition, graduate applicants must provide their cumulative undergraduate grade point average.
   - List of applicant’s public presentations and publications, if any
   - A sentence or two on the applicant’s academic interests and motivations
   - A sentence or two on the applicant’s career plans

3. The background page should be followed by an abstract page containing the following information:
   - A project title.
   - An abstract not to exceed 500 words that briefly describes the student’s studies or research.

4. The remaining five pages can be used to detail how the project meets the selection criteria. Explain the following:
   - How the student’s studies or research meet the award scope and objectives and focus areas
   - The potential human health and/or environmental benefits
   - The potential application to academia, industry, and society
   - The innovation and scientific merit of the student’s project

Quantitative statements of benefits are more useful to judges than qualitative ones. The judges recognize that some applicants will not be able to conduct a full lifecycle or cost-
benefit analysis, but like to see a discussion of impacts across the lifecycle. Some selection criteria might not apply to every project. Such instances should be indicated where appropriate.

There is no limit on the number of applications that can be submitted by any one academic institution or project advisor; however, only one application is permitted per student. Students who completed their degree prior to May 1 of the previous year are not eligible for the award. All applications received will be considered public information. No material will be returned. Award program sponsors are not responsible for lost or damaged applications.

Submission Procedure
A single PDF file of the application must be received by the ACS Green Chemistry Institute® by 5:00 p.m. EDT (GMT-4) on October 9, 2021. Send via email to gci@acs.org with “Hancock Award Application – [applicant’s last name]” in the subject line.

Judging Applications
A panel selected by the ACS Green Chemistry Institute® will judge the applications. This panel might include members of the scientific, educational, industrial, governmental, and environmental communities. Judges might request verification of any activities described or claims made in applications that are selected as finalists. The judges will select the student(s) whose project best meets the selection criteria for the award.

Notification of Award Recipients
Notification of the award and award amount will be made on or before December 18, 2021. The official public announcement of the award recipient will be made during the annual Green Chemistry & Engineering Conference, held June 14-16, 2021 in Reston, VA. A certificate and check for the award amount will be presented to the student during the ceremony. The recipient will be notified prior to the public announcement and will be asked to verify that he or she will be able to attend the ceremony.

Additional Information
Questions about the Hancock Memorial Student Award should be directed to the ACS Green Chemistry Institute*: Email gci@acs.org (preferred) Tel (202) 872-6102.