EuChemS
European Chemical Society
—Working Party on Ethics in Chemistry—

EthiChem

Newsletter – January 2022

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News

December 17th 2021: Working Party Ethics in Chemistry Steering Board Constitution Meeting (online)
The newly elected steering board met and delegated the positions. For a period of four years, the following offices are occupied by:
- Senior Chair (previous chair): Prof. Hartmut Frank
- Chair: Prof. Anca Silvestru
- Vice Chair: Dr. Hans W. Steisslinger
- Secretary: Dr. Jan Mehlich

January 13th 2022: Steering Board Meeting (online)
The steering board discussed its performance as a team and planned future activities. Projects to pursue next are the website and this newsletter.

January 28th 2022: Extended Steering Board Meeting (online)
The steering board and the advisors explored topics as future focus areas of engagement. Strengthening the communication and involvement of all WP members will be a key point!

Case of (un)Ethical Chemistry

Dr. Xiaoling Liu in Prof. Brigitte Voit's group at Leibniz Institute of Polymer Research, Dresden: Data Manipulation, Date Re-use, Ombuds Committee Bias
Dr. Liu, now assistant professor at Sichuan University (China), and some co-authors published a paper in Angewandte Chemie on polymersom synthesis. It was retracted (or rather: withdrawn) because of obvious fabrication of cryo-TEM images of polymersomes. This and other comments on PubPeer.com on problems with other of Liu's papers increased the doubts about her scientific integrity. While the manipulation of images with graphic software is without doubt scientific misconduct, the re-use of data in several publications without reference seems to be acceptable for some commentators. Another issue is the fact that Liu's supervisor, Prof. Voit, confronted with the matter by science journalist Leonid Schneider, was reluctant to initiate an investigation of the case. Trying to contact the "*central ombudspersons on the Leibniz Ombuds Committee*", the one in charge for fraud allegations, Schneider found that the ombudsperson is, in fact, Prof. Voit. In late 2021, after Prof. Voit relinquished her position due to bias, the committee started an official investigation of Liu's work, including her PhD thesis.

Editorial

Dear Reader,

You are reading the first issue of a Newsletter that the EuChemS Working Party on Ethics in Chemistry is going to publish regularly in the future. We, the steering committee of the working party, believe that there is a great number of ethically relevant topics in the context of chemistry and, respectively, of chemically relevant discussions in applied ethics. We are planning to use this communication channel to highlight such topics and bring them to your attention. Yes, we want to be visible. But not for the sake of being visible (because we are narcissists), but because we are firmly convinced that we chemists have something important to say in these discussions, and that, more importantly, we chemists have a responsibility to be informed and aware of ethical implications of our professional activities.

We will use this medium to put ethics in chemistry on the agenda of responsible chemistry. Every issue will feature a short essay on an urgent matter. There will be case discussions, reports of recent activities in the field, profiles of working party members and other figures in ethical chemistry, book reviews, and upcoming event hints. In order to make this a vital project, you are kindly invited to contribute with your input! You read about a case of fraud in chemical research, participated in a symposium on ethics in chemistry, published a book about responsible chemistry, or you want to share an essay-length position on a moral aspect of chemistry? Then, please, don't hesitate to send it to us! We will be thankful for all your valuable submissions!

Enjoy the read and all those to come!

Your WP EiC Steering Committee

The Relevance of Ethics for the Chemical Professions

by Jan Mehlich

Imagine innovation processes that involve, amongst other contributions, the expertise of chemists: A scientist working in the research and development (R&D) department of a company that produces sustainable agriculture products; a biomedical chemist developing diagnostic test arrays for a medical technology company; a toxicologist working in a regulation agency assessing the safety of food packages. In all cases, these technical experts make choices among several possible options concerning the direction innovation takes. Some of these choices are assessed with scientific, technical, or numerical means: life cycle assessments, risk assessments, technical feasibility, economic competitiveness, existing expert knowledge. Yet, all the choices have elements that cannot be settled with scientific-technical facts, numbers, or advanced experimentation. What something *is good for*, what is *desirable* or *preferable*, what serves a particular social or ethical *value* (for example, health, safety, integrity, justice, freedom, sustainability, etc.), and why one value is *prioritised* over another, are *normative judgments* that are an inherent and inevitable part of design decisions in socio-techno-scientific innovation processes. In terms of the examples above, the R&D chemist might notice that her definition of sustainability differs drastically from the management's idea of it; the biomedical chemist's breakthrough is rejected because of regulations in medical diagnostics contexts; or the toxicologist learns that his safety-by-design concept conflicts with various economic interests.

Chemistry faculties at universities and colleges educate their students in the state-of-the-art of their academic and applied discipline, of course. Yet, in their later careers, as scientists, engineers, innovators, developers, etc., one of their key responsibilities is making the *right* choices and decisions in the context of their research, innovation, or regulation activity. The competence to fully survey and judge what is *right* is not acquired through the successful study of chemistry and related subfields. At the same time, such judgments can neither be delegated entirely to other stakeholders of the innovation process, nor can they be made with mere common sense or intuition in a satisfying, plausible, and scrutiny-withstanding manner. As participants of an interdisciplinary innovation team—it is assumed, here, that all innovation processes including academic research, corporate R&D, and techno-scientific governance are teamwork—, scientific-technical experts contribute factual knowledge and technical competence concerning the issue at hand. This input, however, is always set into perspective of goals, purposes, ends, or values. Experiences show that innovation efforts have a higher chance of value co-creation (for example, functionality, utility, profitability, sustainability, personal and social integrity, ethical acceptability) when the contributing experts exhibit a strong normative judgment competence.[1]

The idea of scientific and technical experts with the ability to see the larger picture of their work and to make competent informed decisions has been framed and communicated by many approaches such as post-normal science and technology (PNST), X-by-design (with X being safety, ethics, sustainability, or other norms or values considered important), open innovation, responsible research & innovation (RRI), or constructive technology assessment. Some of these are rather theoretical, others focus on pragmatic-practical aspects. All share the overarching goal of guiding scientific and technological (S&T) progress into a direction that is beneficial for society and environment. While the concepts are around for decades, the educatory efforts to train S&T actors in RRI, ethical judgment, or interdisciplinary discourse performance are still in their infancy and seldom leave their own disciplinary boundaries (for example, courses on PNST in sociology departments, philosophy and ethics of science in philosophy departments, or RRI courses in technology assessment institutes).

Normative-ethical competences can and should be trained during the chemistry education at universities. Whereas chemistry students learn scientific information literacy in their main curricular courses, they learn what may be coined *normative literacy* in courses on science, technology, innovation, and engineering (STIE) ethics that cover aspects of scientific integrity and societal impact of innovation. An online course that has been conceptualised by the EuChemS WP EiC and taught based on these considerations is described in [2]. Its evaluation results show that normative literacy is teachable, useful, and effective in view of the goals of RRI.

[1] Owen, R.; Bessant, J.; Heintz, M. (eds.) (2013): *Responsible Innovation. Managing the responsible emergence of science and innovation in society*. Chichester: Wiley.

[2] Mehlich, J. (2021): *Good Chemistry. Methodological, Ethical, and Social Dimensions*. London: Royal Society of Chemistry.

Profile

Prof. Hartmut Frank

Environmental Chemistry, University of Bayreuth

Prof. Hartmut Frank has been concerned about the social and environmental impact of chemical activity throughout his long and productive academic career as an environmental chemist. This concern is highly visible through his efforts as a scientific advisor for the OPCW; his various publications on topics at the intersection between chemistry, ethics, and society; and his founding of the working party *Ethics in Chemistry* of the European Chemical Society (EuChemS). The role of chemical sciences and research—and of chemical scientists and researchers—in the discourse on chemical weapons has been a central element of these activities. Not only did Prof. Frank put the important topic of chemical weapons effectively onto the agenda of chemical discourse, practice, and education, he also pushed and promoted the development of a clear and practicable definition of chemists' responsibilities and guidelines concerning this matter.

He views the ethical imperative of chemical agency as a pragmatic-practical one, and neither a moral-philosophical or abstract issue nor a matter of blame and guilt. From basic academic science to corporate chemical innovation, chemists should be competent in judging the dual use and misuse risk potential of their work and its output. It is thanks to Prof. Frank's tireless efforts to raise awareness for the complex and sometimes hidden pathways of chemical development in academia, industry, and economy that a new generation of chemists feels skilled and confident in discussing these dual use potentials, making and promoting normative judgments and decisions, and looking beyond the core-margin of chemical expertise.

Reading Corner

Ethics of Chemistry: From Poison Gas to Climate Engineering

edited by Joachim Schummer and Tom Børsen
Publisher: World Scientific, 2021, 568 pages
ISBN: 978-9811233531

This volume fills both gaps by establishing the scope of ethics of chemistry and proving a cased-based approach to teaching, thereby also narrating a cultural history of chemistry. From poison gas in WWI to climate engineering of the future, this volume covers the most important historical cases of chemistry. It draws lesson from major disasters of the past, such as in Bhopal and Love Canal, or from thalidomide, Agent Orange, and DDT. It further introduces to ethical arguments pro and con by discussing issues about bisphenol-A, polyvinyl chloride, and rare earth elements; as well as of contested chemical projects such as human enhancement, the creation of artificial life, and patents on human DNA.

Good Chemistry: Methodological, Ethical, and Social Dimensions

by Jan Mehlich
Publisher: Royal Society of Chemistry, 2021, 400 pages
ISBN: 978-1788017435

Practicing chemists face a number of ethical considerations, from issues of attribution of authorship through the potential environmental impact of a new process to the decision to work on chemicals that could be weaponised. By keeping ethical considerations in mind when working, chemists can build their own credibility, contribute to public trust in the chemical sciences and do science that benefits the world. Divided into three parts, methodological aspects, research ethics, and social and environmental implications, Good Chemistry introduces tools and concepts to help chemists recognise the ethical and social dimensions of their own work and act appropriately.

Upcoming Events

February 25th 2022: Working Party Ethics in Chemistry Meeting (all members)