promuove il seminario scientifico

Stand ATIA ISWA ITALIA - ISWA INTERNATIONAL Padiglione B3, Stand 141

giovedì 7/11/2019 ore 11.30 -12.30

DEVELOPMENT OF PROCESSES FOR TREATMENT OF WASTE FLUOROCHEMICALS: TWO CASE STUDIES

I) THERMAL TREATMENT OF SOLIDS CONTAMINATED WITH PER AND POLY-FLUOROALKYL SUBSTANCES (PFAS)

II) CONVERSION OF HALONS, CFCs AND HFCs INTO FLUOROELASTOMER PRECURSORS

Speaker: **Eric Kennedy**

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ABSTRACT

The development of processes to treat waste fluorochemicals, present in fluidic or solid forms, pose many technical challenges, not least of which is the formation of highly reactive hydrogen fluoride as a reaction product. In this presentation, we describe two processes we have developed to treat waste fluorochemicals. The treatment of solid materials contaminated with per and poly fluoroalkyl substances (PFAS) is a challenging and highly topical area. We are investigating the use of thermal desorption as a technology to treat soils and adsorbent materials which have been contaminated with PFAS. The project is examining the fate of the PFAS during heating, where we hypothesise that we can transform the PFAS from a waste substance into a benign product during treatment. It seems that this approach has not been widely considered due to misconceptions with respect to the mechanism of thermal decomposition of these species. From our perspective, waste CFCs, halons and HFC fluids possess valuable C-F bonds, which make them attractive chemical feedstocks for production of useful chemicals. These fluorochemicals are produced at high a cost and are often available in relatively pure compounds and often in large quantities, and thus make them attractive feedstock chemical. In this presentation we describe the development of a non-destructive process for treatment of fluorine-containing synthetic greenhouse gases. The technology is based on the gas phase reaction of these compounds with methane (which is the major component of natural gas). The key reaction step is the coupling of a CF_2 moiety (formed from the synthetic greenhouse gas) with a methyl radical (formed from methane) which results in the formation of $C_2H_2F_2$, (often abbreviated VDF) a highly valued monomer used in the synthesis of acid-resistant fluoropolymers, such as Viton.

Professor ERIC M KENNEDY,
Fellow, Institute of Engineers Australia; Fellow of the Royal Australian Chemical Institute;

DEGREES CONFERRED
BSc (Pure and Applied Chemistry), Hon I, The University of New South Wales, 1985.
PhD, The University of New South Wales, 1989.

POSITIONS HELD
PhD candidate, Australian Institute of Nuclear Science and Engineering (AINSE) Scholarship, UNSW, 1985 to 1989.
Research Fellow, Department of Chemistry, Macquarie University, 1989 to 1991.
Research Associate, Department of Chemical Engineering, Texas A & M University, 1991 to 1992.
Research Associate, Department of Chemical Engineering, Yale University, 1992 to 1994.
Lecturer to Associate Professor, The University of Newcastle, Australia 1994 to 2005.
Head, Discipline of Chemical Engineering, The University of Newcastle, Australia, 2004 to 2008.
Professor, The University of Newcastle, Australia, 2006, continuing.
Head, School of Engineering The University of Newcastle, Australia, 2005 to 2007,
Assistant Dean (Research) Faculty of Engineering and Built Environment, The University of Newcastle, 2009 to 2011.
Deputy Director, (2007 to 2013) and Director, Priority Research Centre for Energy, The University of Newcastle, Australia, 2013 to 2015.

INDUSTRIAL COLLABORATION
Within the context of environment protection and energy-related projects, the research activities of the group have made significant and practical contribution. In addition to undertaking research on the treatment of waste fluorochemicals, we are currently developing processes for the large scale storage of CO_2 via a process known as mineral carbonation, exploring technologies to convert waste glycerol into useful products, developing the use of a Solid Oxide Fuel Cell (SOFC) for conversion of waste or low-grade fuels for power generation.

RESEARCH OUTCOMES

PRIZES AND AWARDS
Royal Australian Chemical Institute (RACI) Applied Research Award, *awarded in November, 2016.*
Harry C. Bigglestone Award for Excellence in Communication of Fire Protection Concepts, which is sponsored by the Fire Protection Research Foundation, the National Fire Protection Association, and *Fire Technology.*
RK Murphy Medal, 2005 Industrial Chemistry Division of NSW RACI; Citation: … *in recognition of their contributions to science and technology in Australia, their contribution to the RACI and, in particular, their research in fire science and engineering*
Eureka Prize for Environmental Research, 2002; Citation: *For innovative research which enables ozone-depleting substances, especially CFCs, to be converted into environmentally benign compounds with an inherent economic value*. (This Prize is funded by individuals and corporate sponsors and presented by Australian Museum).
Royal Australian Chemical Institute (RACI) Green Chemistry Award, 2000 *to recognise fundamental and innovative chemical methods that accomplish pollution prevention through source reduction and that have a broad applicability in industry…*

Research outputs and publications;
H index of 25 (all), i10 index of 85 (all), 3006 citations (all), (Google scholar). Book Chapter: (1), Edited Books: (6), Invited conference presentations: (22), Refereed journal articles: (179), Conference papers: (101), (Non)refereed conference papers, presentations and posters: (124).

Postgraduate Supervision – 42 completed, 9 current students.

RESEARCH FUNDING; in excess of $26M since 1995.
Total of ARC Large and Discovery Projects (9) ARC Linkage Grants (8).
Cooperative Research Centre (CRC) Program (2016-2018) Combined Carbon Capture from Flue Gas Streams and Mineral Carbonation ($11,402,390).