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Michigan Institute for Plasma Science and Engineering

**Wednesday**
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**3:30 pm**
**Room 1005 EECS**


## Prof. Selma Mededovic Thagard
### Clarkson University


# Plasma Treatment of Perfluoro-alkyl Substances in Ion Exchange Brine Solutions: Reactor Design Challenges and Physicochemical Processes at the Plasma-liquid Interface


Plasma-based water treatment (PWT) uses electrical discharges formed in contact with or in the vicinity of water to degrade chemicals in contaminated water. Plasma in these conditions is capable of producing a diverse range of highly reactive species with low energy input without chemical additives, which makes PWT a promising treatment technology. PWT has not yet proven to be viable, largely due to a lack of knowledge for designing effective plasma reactors and targeting appropriate applications. We have developed a bench-scale PWT process to treat perfluoroalkyl substances (PFASs) in groundwater with high enough efficiency to rival leading technologies. A scaled-up continuous-flow prototype demonstrated PFASs degradation rates far exceeding those of the bench system. A more practical solution for PWT of high flowrates of PFAS-containing water is to combine it with an ion exchange (IX) system wherein the plasma treats the IX regeneration brine, a complex chemical mixture of PFASs, methanol, and sodium chloride. In this talk development of PWT systems will be discussed, correlating bulk liquid transport with the plasma-liquid interface dynamics using analytical measurements and fluid dynamics modeling.


**About the Speaker:** Thagard received her BS in chemical engineering from the U. of Zagreb in Croatia and her Ph.D. in chemical engineering from Florida State U. Before coming to Clarkson, Thagard held post-doctoral appointments at Toyohashi U. of Technology in Japan and at Colorado State U. Her expertise is in electrical discharge plasma processes with a focus on theoretical and experimental investigations of fundamental plasma chemistry in single and multiphase plasma environments. Her research group is pursuing national and international interdisciplinary projects, including: (i) Development of chemical reactors for plasma-assisted water treatment, (ii) Plasma sterilization and food decontamination, and (iii) Plasma-assisted conversion of liquid fuels into hydrogen-rich gas. Thagard has coauthored 35 journal articles, three book chapters, and three patents. Her work has been funded by NSF, EPA, NY Pollution Prevention Institute and United States Air Force. Thagard serves on the Editorial Board of Plasma Chem. Plasma Proc.