Environmental Research & Education Foundation™
Lighting a path to sustainable waste management practices

Press Release

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EREF Awards Nine Master's and Doctoral Scholarships for 2020

Raleigh, NC (October 22, 2020) – The Board of Directors of the Environmental Research & Education Foundation (EREF) are pleased to announce the award of nine scholarships to Master's and Doctoral students pursuing education and research in solid waste management.

Congratulations to the 2020 EREF Scholars:

Ryan Anderson
Colorado State University, Ph.D.
EREF Scholar 2020
Advancing a Novel Anaerobic Digestion Process for Producing Fatty Acids from Solid Wastes

When solid waste undergoes anaerobic digestion methane is generated, which can be used for energy. However, Anderson's work investigates a potentially more valuable anaerobic digestion product than methane. When operating an anaerobic digester at a low pH, methane production is inhibited, leaving fatty acids in the reactor. These fatty acids can be used to make useful chemicals, bioproducts and even plastics.

Seth Kane
Montana State University, Ph.D.
EREF Scholar 2020
Treatment of Plastic Waste for Concrete Reinforcement to Increase Viability of Plastic Recycling in Rural Areas

A potential use for lower value plastic waste is to employ it as an aggregate in concrete. However, a limitation in doing this is that a decrease in the strength of the concrete has been observed. To address this problem, Kane's research aims to develop methods to reinforce concrete with plastics that improve the strength, resist fracture and decrease damage from freeze-thaw cycles when compared to non-reinforced cement. In addition, as concrete is most often produced locally, this can provide a local option for plastic waste reuse in remote and rural areas where high transportation costs can make plastic recycling costly. Additionally, this provides options to reuse mixed plastic type, contaminated and otherwise hard to recycle plastic waste at a lower cost than traditional recycling.

Kameron King
Old Dominion University, Ph.D.
EREF Scholar 2020
Co-Digestion of Food Waste and the Aqueous Phase from Hydrothermal Carbonization of Mixed MSW

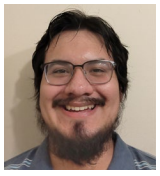
In 2017, the United States Environmental Protection Agency reported that Americans generated over 268 million tons of municipal solid waste (MSW); with 44 million tons of food waste each year – which can be a key source of energy via the methane generation potential this waste holds. A potential strategy to utilize waste as a resource is the integration of two processes - hydrothermal carbonization (HTC) and anaerobic digestion (AD). When the waste is broken down through HTC, hydrochar, gas and an aqueous waste are produced. Both the hydrochar and gas can be recovered, but the aqueous waste must still be treated. King's research investigates the use of AD to convert the aqueous waste to recoverable, methane-rich biogas.

Vanessa Maldonado
Michigan State University, Ph.D.
EREF Scholar 2020
Destructive Technologies for the Degradation of Per- and Polyfluroalkyl Substances (PFAS)

PFAS are a group of synthetic chemicals widely used in multiple consumer products (e.g. textiles, non-stick cookware) and industrial processes (e.g. fire-fighting foams, electronics) due to their unique properties and high chemical/thermal stability. Many of these products are disposed of in landfills, and PFAS has been detected in landfill leachates. Most landfill leachate is treated, which depending on the technology can generate a concentrate solution containing PFAS or saturated granular activated carbon (GAC). Currently, a number of destructive technologies are being evaluated as alternatives to sending the concentrate or saturated GAC back to a landfill, which might contribute to higher PFAS concentrations over time. Electrochemical Oxidation (EO) and Plasma Treatment (PT) are some of the destructive technologies that have the potential to degrade PFAS. In this research, Maldonado targets both technologies, EO and PT to destroy PFAS present in landfill leachates and saturated GAC containing PFAS, respectively.

Brooke Marten
University of Colorado, Boulder, Ph.D.
Tom J. Fatjo Scholar 2020
Organic Waste Management Systems – A Comparative Environmental Impact Assessment

There are a number of approaches to organics waste management. Marten's research uses life cycle assessment (LCA) to compare the environmental impacts of various organic waste disposal options (i.e. conventional disposal in an engineered landfill with a landfill gas energy recovery system, anaerobic digestion, incineration and pyrolysis). One unique avenue that she is modeling is the pyrolysis (destruction of material under pressure at high temperatures, but that does not constitute burning of the waste) of organic waste to produce renewable energy and biochar, a material that can be used as an adsorbent to treat wastewaters, such as landfill leachate. The overall goal of her research is to quantify the environmental implications of each disposal route (e.g. conventional landfilling with energy generation, anaerobic digestion, incineration, pyrolysis) and encourage a shift to more sustainable organic waste management.



Marcos Miranda
Ohio State University, Ph.D.
EREF Scholar 2020
Changing the Narrative Around Industrial Solid Waste By-Products

When fossil fuel is burned to create energy, it releases an array of different gases, one of which is sulfur dioxide (SO_2). Before being released into the atmosphere as flue gas, the SO_2 must be removed using a process called flue gas desulfurization (FGD). Miranda's project addresses several issues related to the FGD material that is produced, a material which is often landfilled, and acid mine drainage (AMD). AMD is a byproduct of mining activities where ore materials react to form sulfuric acid and dissolved iron, which can create pollution if not addressed. The research team has designed a treatment system that removes harmful pollutants from the AMD waters without the need for external inputs (i.e. energy or chemicals) and mixes the AMD with the FGD material. This incorporation of FGD material the causes the ore materials within the liquid to coalesce and form a precipitate that is concentrated with rare earth elements that can later be extracted. This material, after the extraction of valuable minerals, also has the potential to be used to backfill abandoned mines to prevent future generation of AMD.

Kelsey Rodriguez
University of Central Florida, MS
EREF Scholar 2020
Electrochemical-based Degradation Technology for the Treatment of Per- and Polyfluoroalkyl Substances (PFAS) in Landfill Leachates

Per- and polyfluoroalkyl substances (PFAS) are man-made chemicals linked to potentially adverse human health effects. However, due to PFAS's strong chemical structure, they represent a class of environmentally persistent chemicals that make removal difficult with conventional treatment technologies (e.g. biological treatment), particularly in landfill leachate. This research seeks to use a newly created nanotechnology that utilizes electrochemistry for PFAS removal in landfill leachates. The electrochemistry provides the needed energy to break the strong chemical bonds inherent of in PFAS and overcome the traditional barriers of conventional advanced oxidation processes.

Angel Villarruel-Moore
University of Central Florida, MS
DCA Scholar 2020
MSW Incinerator Ash Co-Disposal with Unburned Waste: Implications for Elevated Temperatures

In recent years, there have been several landfills which have reported landfill gas temperatures in exceedance of their permitted limits set forth by the new source performance standards (NSPS) – these heightened gas temperatures are indicative of elevated temperatures in the waste itself. Previous research has shown a correlation between landfills with elevated temperatures and those which accept various combustion ashes as either daily cover or as waste itself. Villarruel-Moore's research is focused on investigating various combustion ashes with the goal of identifying key compounds responsible for the observed exothermic activity that leads to elevated temperatures.

Anna Yip
University of California, Berkeley, MS
EREF Scholar 2020
UC Berkeley Plastics System Analysis

Single-use plastics have come under scrutiny with many cities and states initiating policies and goals to reduce or prohibit single-use plastics. The plastics narrative typically revolves around encouraging recycling; however, Yip's work aims to flip this narrative, asking not how can we encourage recycling, but how can we reduce plastic waste altogether. Yip's research project can be separated into two parts: (1) to offer a more in-depth, responsible and transparent look at UC-Berkeley's plastic consumption and waste, and (2) to calculate the impacts of the newly proposed policy to "eliminate all non-essential single-use plastics for which there are viable alternatives by end of calendar year 2030".

EREF scholarships recognize graduate students pursuing excellence in solid waste management research and education. Recipients are chosen based on credentials and potential contributions to the solid waste industry and its scientific community.

EREF scholarship applications for the 2021-2022 school year are due late Spring 2021. At the time of application, students must be, or will be in 2021, a full-time master's or doctoral student, and have a clearly demonstrated interest in solid waste management research.

For more information on the EREF Scholarship Program or to access the application, please visit erefdn.org.

EREF is a 501(c)3 class charity that funds and directs scientific research and educational initiatives for waste management practices to benefit industry participants and the communities they serve. For more complete information on EREF funded research, its scholarship program and how to donate to this great cause, visit erefdn.org.

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Higher-res images are available upon request