# 2022 Waste-management Education Research Conference (WERC 2022)

Las Cruces, New Mexico, USA 10-13 April 2022



IEEE Catalog Number: CFP22W84-POD ISBN: 978-1-6654-7949-3

## Copyright © 2022 by the Institute of Electrical and Electronics Engineers, Inc. All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

\*\*\* This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.

 IEEE Catalog Number:
 CFP22W84-POD

 ISBN (Print-On-Demand):
 978-1-6654-7949-3

 ISBN (Online):
 978-1-6654-7948-6

### **Additional Copies of This Publication Are Available From:**

Curran Associates, Inc 57 Morehouse Lane Red Hook, NY 12571 USA Phone: (845) 758-0400

Fax: (845) 758-2633

E-mail: curran@proceedings.com Web: www.proceedings.com







#### Introduction

Papers presented at this conference are the result of participation in the 2022 WERC Environmental Design Contest hosted by the College of Engineering at New Mexico State University.

Now in its 32<sup>nd</sup> year, the Design Contest is modeled after an engineering RFP, challenging college teams to solve problems in emerging areas of environmental concern. Teams submit a technical report, give an oral presentation, present a conference-style poster, and demonstrate a working bench-scale model of their design. WERC independently tests all results during the contest, and judges are professional engineers who share a wealth of expertise with the contestants.

Twenty one teams competed in the design contest. Of those teams, judges recommended eleven technical reports to be considered for publication. From that subset, a group of three papers were determined to be eligible for publication after a second review process.

#### Contents

Monitoring Virus Removal by Membrane Bioreactors during Water Reuse:
 California Polytechnic State University – San Luis Obispo:

Using SYBR Stain in the Assessment of Removal Efficiency and Continuous Detection of Viruses in Membrane Bioreactors.........1

2. Carbon Conversion for the Energy Transition:

University of Idaho:

Carbon Dioxide Conversion to Sodium Formate and Valuable Byproduct......9

3. Lunar Regolith Dust Cleaning for Spacesuits

University of Colorado, Boulder

Utilizing Cryogenic CO<sub>2</sub> Spray Process for Removal of Lunar Regolith Dust Adhered to Spacesuits.......20