

Cloud foaming experiment

Valerio Loiano, Alessandra Longo, Daniele Tamaro, Ernesto Di Maio, Pier Luca Maffettone

Dipartimento di Ingegneria Chimica, dei Materiali e della Produzione Industriale, University of Naples Federico II, P.le
Tecchio 80 I-80125 Naples, Italy

The 2019 pandemic locked lab doors to students and guest colleagues, with an impoverishment for all. Inspired by the 2015 work on "cloud chemistry" at the University of Nottingham, we designed an experimental facility to go beyond doors and boundaries. On December 16th, 2020 an entire class of grad students was allowed to virtually enter the lab and really perform a plastic foaming experiment. The hardware and software were conceived in order to remotely control the whole foaming experiment. The autoclave and its closure design, the plastic granules-handling robot, the process control (temperature and pressure), the cameras, were all engineered to allow easy control by inexperienced remote operators and to guarantee safety to the local instructor. Students response was enthusiastic and proved their extreme ability to adapt, to learn, to govern robots and dip into the real world from their virtual doors.