## conferenceseries.com

8th International Conference on

## **BIOFUELS, BIOENERGY & BIOECONOMY**

December 04-05, 2017 | Sao Paulo, Brazil

## Using novel methods (Microwave Radiation and Sonochemistry) for the conversion of biomass to biofuels

Aharon Gedanken Bar-Ilan University, Isarel

The lecture will present the use of novel methods such as Microwave radiation and Sonochemistry in converting micro L and macro algae into biofuels. The lecture will demonstrate the direct conversion of as-harvested Nannochloropsis algae into bio-diesel without separating the lipidic phase. The results are based on the use of two novel techniques. The first being biotechnology-based environmental system utilizing flue gas from coal burning power stations for microalgae cultivation. This method reduces considerably the cost of algae production. The second technique is the direct transesterification (a one-stage method) of the Nannochloropsis biomass to biodiesel production using microwave and ultrasound radiation with the aid of a SrO catalyst. In the early stages of this research the lipidic phase was first extracted from the microalgae and transestrification followed it. Later we became courageous and carried out the transesterification directly on the as-harvested microalgae. Full conversion to biodiesel was achieved in 5 minutes. The combination of SrO solid catalyst and microwave radiation leads to full conversion (~100%) of the microalgae to biodiesel. The results are based on 1H NMR spectroscopy and HPLC results. I will show how agricultural wastes such as Pine Cones, Cicer Arietinum, Cotton, and Sugar Cane bagasse are converted to a fine chemical such as Levulinic acid in addition to conversion to ethanol. In addition, we have successfully converted a macroalgae, Ulva Rigida, into bioethanol getting 16% ethanol from 1 gram of the algae. These results were obtained by optimizing the production of Ulva rigida co-cultured with fed-fish in an offshore mariculture (fish cages) system is reported. Enhanced production of biomass with elevated content of desired carbohydrates is achieved. This SSF (Simultaneous Saccharification Fermentation) process was accomplished with the help of soft sonication. Finally, I will demonstrate a solar system in which a macroalgae solution is flowing on a catalyst and is being fermented by to ethanol aided by the Solar irradiation. This reaction was conducted in a solar reactor that was designed to perform the conversion of starch, glucose, and ulva rigida to ethanol in a single step. The role of the solar energy is 1) activating the catalysts 2) evaporating the ethanol produced in the process. A continuous flow through the apparatus was continued for more than 30 days. The instrument is presented in Figure 1 below.



## Biography

Prof. Em. Aharon Gedanken obtained his M. Sc. from Bar-Ilan University, and his Ph. D. degree from Tel Aviv University, Israel. After his postdoctoral research at USC in Los Angeles. He got a lecturer position at BIU on Oct. 1975. He spent two sabbatical years at AT&T Bell Laboratories in 1980-8I, and 1987-88 as well as a summer in 1984. He also has done research at NIDDK, NIH in the summers of 1989, 1990 and 1991. In 1994 he switched his research interest from Spectroscopy to Nanotechnology. His special synthetic methods of nanomaterials include: Sonochemistry, Microwave Superheating, Sonoelectrochemistry, and Reactions under Autogenic Pressure at Elevated Temperatures (RAPET). Since 2004 he is mostly focused on the applications of nanomaterials. Gedanken has published 782 per-reviewed manuscripts in international journals, and has applied for 38 Patents. His H-Index is 85 according to the WEB of SCIENCE. Gedanken has served as the Department Chairman as well as the Dean of the Faculty of Exact Sciences at Bar-Ilan University. He is on the editorial boards of 4 international journals. He still leads a group of 13 research people. He was a partner in five EC (European Community) FP7 projects one of them, SONO, was coordinated by him. This project was announced by the EC as a "Success Story". He is a partner in PROTECT a textile project in Horizon 2020. He was the Israeli representative to the NMP (Nano, Materials, and Processes) committee of EC in FP7. He was awarded the prize of the Israel Vacuum Society in 2009 and the Israel Chemical Society for excellence in Research in Feb. 2013.

Aharon.Gedanken@biu.ac.il