

International Congress and Expo on **Biofuels & Bioenergy**

August 25-27, 2015 Valencia, Spain

Direct supercritical transesterification of wet unwashed pastes from green microalgae (*Nannochloropsis gaditana*, *Chlorella sp.* and *Nannochloris sp.*) for biodiesel production

Souhir Jazzar¹, Joaquín Quesada-Medina², Pilar Olivares-Carrillo², Mohamed Néjib Marzouki¹, Francisco Gabriel Acién-Fernández³, José María Fernández-Sevilla³, Emilio Molina-Grima³ and Issam Smaali¹

¹University of Carthage, Tunisia

²University of Murcia, Spain

³University of Almería, Spain

With the over-consumption of fossil fuel reserves and their impact on climate changes, the search for renewable and clean biofuels is becoming necessary. Biodiesel is considered nowadays as one of the most promising alternative for replacing petroleum diesel. For biodiesel production, microalgae have received a particular attention due to their photosynthetic efficiency, high cellular lipid content, CO₂ fixation and growth on non-arable lands unsuitable for food crops. However, the main drawbacks of microalgae-based biodiesel process are the biomass drying step responsible of high energy consumption and the difficult lipid recovery from the thick algal cell walls. In this work, biodiesel was produced by a single-step catalyst-free process using direct or in situ supercritical methanol transesterification from wet unwashed green microalgae (*Nannochloropsis gaditana*, *Chlorella sp.* and *Nannochloris sp.*). The main process parameters were first optimized for *Nannochloropsis gaditana* (Lubián CCMP 527) by studying the effect of methanol to microalgae ratio (6:1-12:1 vol./wt.), reaction time (10-50 min) and temperature (245-290°C). A maximum biodiesel yield of ~46 wt% was reached for a methanol to microalgae ratio of 10:1 (vol./wt), reaction time of 50 min and temperature of 265°C. These optimized parameters were then applied for newly isolated species of *Chlorella sp.* and *Nannochloris sp.*, issued from the south-western Mediterranean Sea, and maximum biodiesel yields of 45.62% and 21.79% were achieved, respectively. Additionally, the effect of the supercritical process on the algal cell wall structure was investigated by scanning electron microscopy observations.

jaz.souhir@yahoo.fr

Notes: