

Title: **Modulation of seed germination by plasma surface treatments.**

Student: Alba Lalueza Sanchez

Date: June 2019

Supervisor/s: Dr. Fermín Huarte Larrañaga

Departament of Materials Science and Physical Chemistry

Dr. Ricardo Molina Mansilla

Institute for Advanced Chemistry of Catalonia (IQAC-CSIC)

In this study the modulation of the surface properties of wheat seeds is studied, such as hydrophilicity, promoted by the effect of plasma. Thanks to the improvement in the kinetics of the water uptake, we can improve the efficiency in the germination process during short treatment times (< 120 s). While long times treatment and wet conditions has seen retarded germination (> 300 s). This fact has been attributed to the fact that key processes in the germination such as the exchange of gases (O_2 and CO_2), it is hampered by the accumulation of water in the outer layers of the seed. Total germination is equal to all times of treatment, which has allowed to reject the possibly damage to the embryo. On the other hand, they have characterized the physicochemical changes induced by the plasma in the surface seeds. The OES has determined the chemical species present in the plasma, among which are oxidant species such as hydroxyl radicals and monoatomic radicals of oxygen. Based on the techniques of XPS, SEM and FTIR-ATR has determined the presence of a nanometric layer that covers pericarp (matrix of lignocellulose), with more than 90% of links C-C and/or C-H, that when they oxide (incorporation of polar groups) reverses the polarity of the layer making the surface more hydrophilic. Starting from 300 s treatment, all the techniques used suggest a plasma-induced etching effect that degrades totally or partially the outer layer of wheat seeds.