Functionalized non-toxic carbon nanoparticles from macroalgae (Ulva fasciata) as targeted drug delivery system for lung cancer therapy.

Authors**:** Estrella M. Otero-González[1], Alexander Rodriguez-Hernández[2], Liz M. Díaz Vázquez[1]

University of Puerto Rico-Río Piedras, Department of Chemistry[1]

University of Puerto Rico-Río Piedras, Department of Environmental Science[2]

Lung cancer is the leading cause of cancer-related death worldwide. Currently scientists have not been able to produce an effective and targeted approach to treat large cell carcinoma (LCC) nor small cell lung cancer (SCLC). One of the most promising drug delivery systems are based on the use of nanoparticles, due to their size and functionalization capacities. In the past, algae have been used to produce nanomaterials for platinum base drug (cisplatin) treatments in A549 lung cancer cells, nonetheless these procedures consume all the algae and send to waste every byproduct. Due to the latter we are determined to use byproducts (char) of the hydrothermal liquefaction procedure, a technique which produces biodiesel from biomass, extracting from green macroalgae (Ulva fasciata) in order to produce non-toxic carbon nanomaterials to serve as our drug delivery systems. Consequently, the focus of this project will be to synthesize non-toxic carbon nanomaterials with low cytotoxicity and high functionalization capacity, using bioactive compounds from macroalgae as a starting material. We will enhance the targeting of cancer cells by functionalizing the nanoparticles with antibodies and peptides that improve the selectivity of the drug delivery. Finally, we will improve the solubility of cancer treatment drugs to enhance the optimal concentration of dose versus response, in order to enhance the dose response ratio for drugs.