Research Lines

The new research projects of the PPC for the 2021-2024 quadrennium will be developed in the new research lines approved by the board, which are adjusted to the demands of the region in which the PPC is located. These new lines are contained in the only area of concentration, namely Chemistry, and are described below.

a) ***Methods of Analysis and Environmental Chemistry*****:** Aims to improve or develop procedures and devices for chemical and/or biological analysis for potential contaminants and emerging pollutants from the Amazon Biome. The studies are conducted on samples of natural foods, surface, residual, and underground water resources, soils, sediments, industrial effluents, aquatic and terrestrial plants, pathogens (microorganisms), among others, in order to diagnose potential negative impacts caused by different analytes in undesirable concentrations to ecosystems and living beings.

b) ***Chemistry of Natural Products and Biotechnology*****:** Chemical study, isolation, and identification of biologically active secondary metabolites from plants and microorganisms, mainly from the Amazon environment, and study of the biological activity of extracts and isolated substances. The exploration of plant and microorganism metabolism can still be directed towards chemotaxonomy studies. It also involves the use of biological systems, living organisms or their derivatives with biotechnological potential, for the production of biofuels and the reuse of plant biomass available in the Amazon environment, as well as to produce and/or modify products and processes in the development of cleaner routes that reduce process costs.

c) ***Theoretical and Computational Chemistry*****:** It involves the use of Theoretical and Computational Chemistry methods and modeling to calculate properties of organic and inorganic molecular and crystalline systems using semi-empirical, ab-initio, and DFT Theory methods. From the modeling of molecular and crystalline structures, as well as the determination of the electronic structure of the studied compounds, physicochemical properties of interest in various areas of chemistry are predicted.

d) ***Materials Chemistry and Nanomaterials*****:** It involves the development and characterization of new materials and nanomaterials, whether they are inorganic, polymeric, or organometallic, such as composites, zeolites, and ceramics, which are of industrial and environmental interest, for different applications, such as in catalysis, biotechnology, nanotechnology, environmental uses, etc. Special emphasis is given to the products and by-products of mining and industrial activities and plant extraction in the Northern Region of Brazil, which enable the synthesis of new materials, and ecological practices from sustainable chemical processes.