



**“Gh. Asachi” Technical University of Iasi, Romania**

---

***ICEEM/03 – ENVIRONMENTAL ENGINEERING  
SECTION  
Environmental Pollution and Monitoring***

**MICROALGAE AS SUSTAINABLE CELL FACTORIES**

**Yusuf Chisti**

*Institute of Technology and Engineering, PN 456, Massey University, Private Bag 11 222,  
Palmerston North, New Zealand; e-mail: Y.Chisti@massey.ac.nz*

---

**Abstract**

Microalgae and cyanobacteria are sunlight-driven cell factories that convert carbon dioxide to potential biofuels, foods, feeds and high-value bioactives. In addition, these microorganisms are useful in several bioremediation applications and as nitrogen fixing biofertilizers. This work discusses the industrial and environmental applications of microalgae and the production of algae in photobioreactors. Suitably designed photobioreactors are substantially more productive in comparison with open ponds and “raceways” that have been traditionally used for culturing microalgae. Furthermore, photobioreactors allow monoseptic culture of many more algae than can be grown in open systems. Design of photobioreactors requires an ability to accurately estimate the photosynthetic irradiance level; supply the necessary amount of carbon dioxide; remove the inhibitory oxygen produced by photosynthesis; ensure rapid light–dark cycling of cells for enhanced productivity; and limit the maximum level of turbulence that the fragile algal cells are exposed to. These and other aspects of photobioreactor engineering are discussed.

*Keywords:* microalgae; cyanobacteria; environmental sustainability; biofuels; biofertilizers; photobioreactors; carbon sequestration

---