The effect of radiation dose onto PLA for drug delivery system

Daniela F. Cabral[1], Heloísa A Zen, Ademar B. Lugão

IPEN-CNEN/SP
e-mail: danielafaria73@gmail.com

Polylactic Acid (PLA) is well known polymer in the medical field, including sutures, fixation rods, and plates, due to its unique properties and numerous benefits. Unlike traditional materials that often require surgical removal after healing, PLA gradually degrades within the body, reducing the need for additional procedures and minimizing patient risk. As a biodegradable and biocompatible polymer derived from renewable resources, PLA is increasingly utilized in various medical applications, including tissue engineering, drug delivery systems and bioabsorbable implants. The radiation process is used to modified PLA; gamma and electron beam irradiation, are employed to induce crosslinking and degradation processes that can improve the mechanical and thermal characteristics of PLA. At lower doses of irradiation (typically below 50 kGy), crosslinking predominates, resulting in enhanced mechanical strength and thermal stability. However, at higher doses, degradation processes become more prevalent, leading to a reduction in molecular weight and potential loss of material integrity. The controlled degradation of PLA can be advantageous for applications like drug delivery systems, where the gradual release of therapeutic agents is desired and also can enhance the antimicrobial properties of PLA-based materials, making them suitable for food packaging and medical applications. In this work was studied the effect of 10kGy, 20kGy and 30kGy irradiation onto PLA to be used as drug delivery system.