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Vibrational analysis of CO_2 laser treated poly lactic acid

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Poly lactic acid (PLA) is one of the most commonly deployed bioresorbable polymer used for the biomedical and consumer applications. For any application, the degradation rate of the polymer is a key consideration. The degradation rate of PLA can be altered through various techniques like blending, grafting, and gamma radiation. Laser radiation is one of the most efficient and easily controlled thermal processes for treating bioresorbable polymers. However, the structural changes taking place during the treatment can enhance or accelerate degradation of the material. In order to study the structural changes in the polymer, a detailed vibrational analysis of CO_2 laser treated PLA sheets were carried out using simple and non-destructive techniques: Fourier transfer infrared spectroscopy: attenuated total reflection (FT-IR: ATR) and Raman spectroscopy. The spectra before and after laser treatment were compared. The samples were examined by taking measurements on both sides of the sample (irradiated and non-irradiated side). This helped to verify the bulk modification of the polymer through laser treatment. There were variations observed in the spectra which were interpreted as changes in the degree of crystallinity of the polymer sample. Raman spectroscopy further verified the vibration regions observed in the FT-IR: ATR spectrum.

Biography

Foram Dave has completed her bachelor of engineering in Rubber Technology from Gujarat Technological University in 2013 and master of technology in Polymer Science and Engineering from Indian Institute of Technology, Delhi, India in 2016. Her master thesis was based on biodegradable polymers for biomedical applications. She worked as a senior engineer at Robert Bosch Engineering and Business Solutions Pvt. Ltd in Automotive Electronics department dealing with sealants, thermal interface material and conformal coating from 2016 to 2018. She joined PhD at Institute of Technology Sligo, Ireland in September 2018 in the field of Laser Transmission Welding of Polymers along with Abbott diagnostics.

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