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from random and end scissions to polymer degradation; 3.7 Concluding remarks; References; 4Modelling degradation of semi-crystalline biodegradable polyesters; 4.1 Introduction; 4.2 Rate equation for chain scission in semi-crystalline polymers; 4.3 Actual and extended degrees of crystallinity; 4.4 Extended degree of crystallinity of chain cleavage-induced crystallisation; 4.5 Summary of governing equations for simultaneous chain scission and crystallisation 4.6 Calculation of number-averaged molecular weight4.7 Comparison between models assuming fast and normal crystallisation; 4.8 Concluding remarks; References; 5Modelling biodegradation of composite materials made of biodegradable polyesters and tricalcium phosphates (TCPs); 5.1 Introduction; 5.2 TCP dissolution and buffering reactions; 5.3 Rate equation for chain scission in presence of buffering reactions; 5.4 Governing equations for degradation of polyester-TCP composites; 5.5 Normalised equations; 5.6 TCP effectiveness map; 5.7 Concluding remarks; References
6Modelling heterogeneous degradation of polymeric devices due to short chain diffusion6.1 Introduction; 6.2 Scission rate of long chains affected by short chain diffusion; 6.3 Diffusion equation for short chains; 6.4 Collection of the governing equations; 6.5 A numerical study of size effect; 6.6 Non-dimensionalisation and degradation map; 6.7 Effect of other factors on the degradation map; 6.8 Concluding remarks; References; Part Two Advanced methods of modelling degradation of bioresorbable polymeric medical devices
7Finite element analysis (FEA) of biodegradation of polymeric medical devices

Sommario/riassunto

The use of bioresorbable polymers in stents, fixation devices and tissue engineering is revolutionising medicine. Both industry and academic researchers are interested in using computer modelling to replace some experiments which are costly and time consuming. This book provides readers with a comprehensive review of modelling polymers and polymeric medical devices as an alternative to practical experiments. Chapters in part one provide readers with an overview of the fundamentals of biodegradation. Part two looks at a wide range of degradation theories for bioresorbable polymers and devices.

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