Green Chemistry and Applications

Editors
Aidé Sáenz-Galindo
Adali Oliva Castañeda Facio
Raúl Rodríguez-Herrera

CRC Press
Taylor & Francis Group
A SCIENCE PUBLISHERS BOOK

Contents

Chapter 2

Atom Economy

Kunnambeth M. Thulasi[1], Sindhu Thalappan Manikkoth[1], Manjacheri Kuppadakkath Ranjusha[1], Padinjare Veetil Salija[1], Vattakkoval Nisha[1], Shajesh Palantavida[2] and Baiju Kizhakkekilikoodayil Vijayan[1*]

[1]Department of Chemistry/Nanoscience, Kannur University, Swami Anandha Theertha Campus, Payyannur, Edat P.O., Kerala-670 327, India.

[2]Centre for Nano and Materials Science, Jain University, Jakkasandra, Ramanagaram, Karnataka, India.

INTRODUCTION

The concept of atom economy was developed by Barry M. Trost in 1991. Organic synthesis requires multiple reagents, facilitating agents and solvents to obtain the desired product. At the end of the reaction everything except for the desired product and reagents that can be recycled, like solvents and catalysts, will end up as wastes, mostly hazardous wastes. Conceptually, if the desired product contains all the atoms making up the reagents there will be no waste generated. The concept of atom economy can be used to identify synthetic methodologies that will retain the maximum number of atoms from the reactants in the final product and thereby reduce wastage. The atom economy concept allows quantification of the efficiency of a reaction with respect to the number of atoms transferred from the reactants to the final desired product (Trost, 1995; Trost, 2002). The concept of atom economy can be applied to every synthesis and be used to define new pollution prevention benchmarks (Cann and Dickneider, 2004; Song et al., 2004). Atom economy calculation, broadly presents a measure of the greenness of a chemical reaction.

*For Correspondence: baijuvijayan@kannuruniv.ac.in; baijuvijayan@gmail.com

mm 152 x 229 mm

uddin
alhi

BIODEGRADABLE MATERIALS

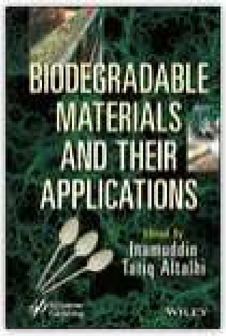
LEY

BIODEGRADABLE MATERIALS AND THEIR APPLICATIONS

Edited By
Inamuddin
Tariq Altalhi

Scrivener Publishing

WILEY



Biodegradable Materials and Their Applications

Editor(s): Inamuddin, Tariq Altalhi

First published: 20 September 2022

Print ISBN: 9781119904908 | Online ISBN: 9781119905301
| DOI: 10.1002/9781119905301

About this book

BIODEGRADABLE MATERIALS AND THEIR APPLICATIONS

Biodegradable materials have ascended in importance in recent years and this book comprehensively discusses all facets and applications in 29 chapters making it a one-stop shop.

Biodegradable materials have today become more compulsory because of increased ... Show all

Table of Contents

Export Citation(s)

15

A Review on Health Care Applications of Biopolymers

Vijesh A. M.[1] and Arun M. Isloor[2,3]*

[1]*P.G. Department of Chemistry, Payyanur College, Payyanur, Kannur, Kerala, India*
[2]*Department of Chemistry, National Institute of Technology Karnataka, Surathkal, Mangalore, Karnataka, India*
[3]*Apahatech Solution LLP, Science and Technology Entrepreneur's Park, National Institute of Technology Karnataka Campus, Surathkal, Mangalore, India*

Abstract
Significant changes in the modern medical field in recent decades are due to the commercialization of new diagnostic tools, surgical devices, and implantable devices. Biocompatible materials played a pivotal role in the success of such medical instruments. The biocompatibility of the material used in health care plays a crucial role in deciding their medical applications. It mainly depends on the chemical composition of the materials used and also with their physical and chemical properties. Interactions between the tissue and the biomaterials also play a major role in the selection of materials for the biomedical applications. Development of cost-effective biomaterials showing fewer side effects is the biggest challenge for the researchers. One can tune and modify the properties of biomaterials based on their applications with great effort. These biocompatible materials are either naturally occurring one or synthetic, which includes biodegradable polymers, metals, alloys, ceramics, and composites. This review chapter discusses few of the recent developments in the biomaterial research mainly used in medical applications.

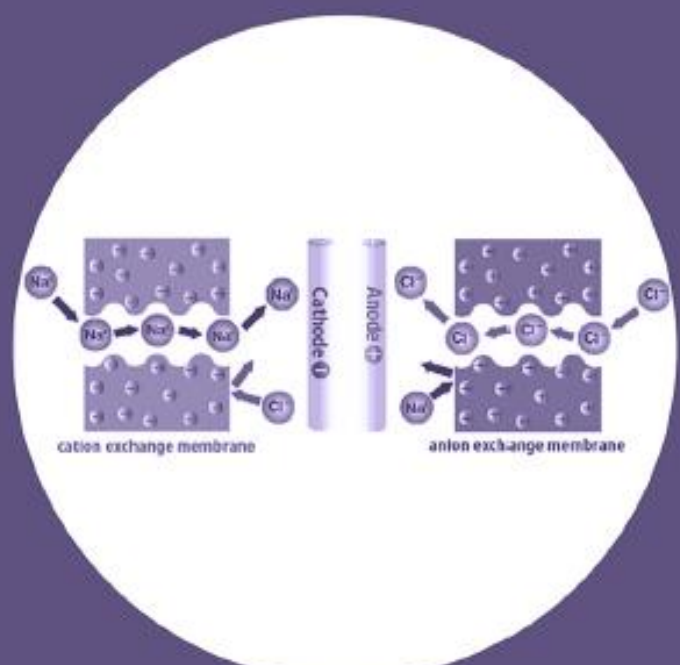
***Keywords*:** Biocompatibility, biomaterials, medical devices, biodegradable materials, implants, biopolymers, metals, biocomposites

**Corresponding author*: isloor@yahoo.com

Inamuddin and Tariq Altalhi (eds.) Biodegradable Materials and Their Applications, (429–456) © 2022 Scrivener Publishing LLC

CURRENT TRENDS AND FUTURE DEVELOPMENTS ON (BIO-) MEMBRANES

RECENT ACHIEVEMENTS FOR ION-EXCHANGE MEMBRANES



EDITORS

ANGELO BASILE
KAMRAN GHASEMZADEH

ELSEVIER

CHAPTER 3

Review on inorganic ion exchange membranes for diverse applications

A.M. Vijesh[1], Arun M. Isloor[2] and Vasantha Kumar[3]

[1]*P.G. Department of Chemistry, Payyanur College, Kannur University, Payyanur, Kerala, India,* [2]*Membrane and Separation Technology Laboratory, Department of Chemistry, National Institute of Technology Karnataka, Surathkal, Mangalore, Karnataka, India,* [3]*P.G. Department of Chemistry, Sri Dharmasthala Manjunatheshwara College (Autonomous), Ujire, Karnataka, India*

3.1 Introduction

Rapid developments in membrane science over the past few decades have brought tremendous changes in several separation applications and clean energy resources and, therefore it is having immense significance in the industrial sector and public health [1–7]. Various types of membranes have been developed by different groups and were used in diverse commercial separation techniques, including ion exchange, pervaporation, nanofiltration, ultrafiltration, microfiltration, reverse osmosis, and electrodialysis (ED) [8–14]. Among the various methods of separation processes, ion exchange membrane (IEM) method is more advanced and energy-efficient. IEMs generally carry anionic and or cationic charged groups. Separation processes using IEMs have more advantages with respect to other techniques by considering their environmentally friendly nature and affordability [15,16].

IEMs are widely used for the separation or concentration of pharmaceutical products and also for the food items that contain ionic species. IEMs are also found to be useful in the manufacture of basic chemical products [15]. IEM-based separation techniques play a major role in water treatment for removal of ionic species from aqueous solutions. Nowadays, IEMs play a vital role in energy conversion processes, its storage, and also in electrochemical synthesis [17]. Many other applications of IEMs such as in redox flow battery are not yet studied properly and are in the early stages of their development. The technical feasibility of the IEMs in various commercial processes varies considerably [18].

ED is a common process that works by using IEMs used for desalination of seawater on industrial scale. The same process is also useful for the separation of a number of

Current Trends and Future Developments on (Bio-) Membranes.
DOI: https://doi.org/10.1016/B978-0-323-88509-6.00019-8

CRC Press
Taylor & Francis Group

Supercapacitors and Their Applications

Fundamentals, Current Trends, and Future Perspectives

Edited by
Anjali Paravannoor
Baiju K.V.

Contents

9 Portable Electronics and Microsupercapacitors

Gopakumar G., Sujith K. V.,
Sarayu Jayadevan, and S. Anas

CONTENTS

9.1 INTRODUCTION

In the present era, we can't even imagine a world without modern portable electronic gadgets like smartphones, wireless devices, smartwatches, laptops, cameras, etc. Nowadays, the significance of flexible, wearable, and portable electronic devices is increasing in various sectors like smart electronics, consumer goods, sports, mobility, security and defence, medical and biomedical, green environment, clean energy, etc. [1–3]. Smart devices launched recently include not just computers or smartphones but every component of smart home technology.

Smart electronic devices generally require huge energy and need to be powered by efficient energy storage devices [2]. Conventional batteries help devices run for a long time on a single charge. The expeditious growth of smart and portable electronics demands flexible, lightweight, small, and wearable power sources. Capacitors are now becoming a key component of basic portable electronics as well as the most modern smart/hybrid electric vehicles by providing rapid delivery of energy despite their poor storage capacity [4]. Researchers are still working hard towards technologies to increase the storage ability of capacitors, strictly maintaining the green energy protocol. Supercapacitors (SCs) are found to be a better choice for addressing the energy issues of the portable electronic device industry. SCs bring

DOI: 10.1201/9781003258384-9