

|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Record Nr.           | UNINA9911092364203321                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Titolo                  | Barrier properties of polymer clay nanocomposites / / Vikas Mittal, editor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Pubbl/distr/stampa      | New York, : Nova Science Publishers, c2010                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| ISBN                    | 1-61761-800-4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Edizione                | [1st ed.]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Descrizione fisica      | 1 online resource (283 p.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Collana                 | Nanotechnology science and technology series                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Altri autori (Persone)  | MittalVikas                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Disciplina              | 620.1/923                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Soggetti                | Nanocomposites (Materials)<br>Polymer clay - Barrier properties                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Lingua di pubblicazione | Inglese                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Formato                 | Materiale a stampa                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Livello bibliografico   | Monografia                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Note generali           | Description based upon print version of record.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Nota di bibliografia    | Includes bibliographical references and index.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Nota di contenuto       | <p>""BARRIER PROPERTIES OF POLYMER CLAY NANOCOMPOSITES""; ""CONTENTS""; ""PREFACE""; ""BARRIER PROPERTIES OF COMPOSITE MATERIALS""; ""ABSTRACT""; ""1.1. INTRODUCTION""; ""1.2. THEORY OF PERMEATION""; ""1.3. PERMEATION THROUGH HETEROGENEOUS MEDIA""; ""1.3.1. Laminates""; ""1.3.2. Materials with Plate-Like Inclusions""; ""1.4. MODIFIED PERMEATION MODELS""; ""1.5. MEASUREMENT OF BARRIER PERFORMANCE""; ""1.6. TRANSPORT MECHANISM AND DIFFERENT POLYMER SYSTEMS""; ""REFERENCES""; ""COMPATIBILIZATION OF INTERFACES IN NANOCOMPOSITES: ROUTE TOWARDS BETTER BARRIER PROPERTIES""; ""ABSTRACT""</p> <p>""2.1. INTRODUCTION"" ""2.2. CONVENTIONAL NANOCOMPOSITES AND NEED OF NEW SYSTEMS""; ""2.3. GRAFTING a€?TO a€? THE SURFACE APPROACH""; ""2.4. GRAFTING a€?FROM a€? THE SURFACE APPROACH""; ""2.5. GRAFTING USING CONTROLLED LIVING POLYMERIZATION APPROACH""; ""2.6. POLYOLEFINS GRAFTING a€?FROM a€? THE SURFACE""; ""REFERENCES""; ""BARRIER PROPERTIES OF POLYURETHANE NANOCOMPOSITES AND THEIR RELATIONSHIP TO SHAPE MEMORY PROPERTIES""; ""ABSTRACT""; ""3.1. INTRODUCTION""; ""3.2. TRANSPORT PHENOMENA IN PRISTINE POLYMERS""; ""3.2.1. Early Developments""; ""3.2.2. Basic Relationships""</p> <p>""3.2.3. Nature of the Penetrant"" ""3.2.4. Nature of the Polymer""; ""3.2.4.1. Effect of Chemical Constituents and the Presence of Chemical Cross-links""; ""3.2.4.2. Effect of Crystallinity""; ""3.2.4.3. Effect of</p> |

Chain Orientation"; "3.3. TRANSPORT PHENOMENA IN MICROANDNANO-COMPOSITES"; "3.4. CONTINUUM MODELING OF TRANSPORTPROPERTIES OF POLYMER COMPOSITES"; "3.5. PERMEABILITY OF POLYURETHANES (PU) ANDPOLYURETHANEUREAS (PUU): STRUCTURE-PROPERTYRELATIONSHIPS"; "3.5.1. Transport Mechanisms"; "3.5.2. Effect of Soft Segment Type, Its Composition, and Molecular Weight"; "3.5.3. Effect of Hard Segment Content and the Extent of Phase Separation"; "3.5.4. Effect of Penetrant Type"; "3.6. PERMEABILITY OF FILLED POLYURETHANES ANDPOLYURETHANEUREAS: MICRO- AND NANOCOMPOSITES"; "3.7. IMPORTANCE OF TRANSPORT PHENOMENONIN SHAPE MEMORY POLYMERS"; "3.7.1. Importance of Mass Transfer in SMP:Actuation by Water Absorption in Surgical Procedures"; "3.7.2. Importance of Mass Transfer through SMP:Textile Fabrics and Refrigerators"; "3.8. CONCLUSIONS"; "3.9. ACKNOWLEDGEMENTS"; "REFERENCES"; "PERMEATION PROPERTIESOF EPOXY NANOCOMPOSITES"; "ABSTRACT"; "4.1. INTRODUCTION"; "4.2. MODELING OF THE PERMEABILITY OF NANOCOMPOSITES"; "4.3. PERMEABILITY OF EPOXY NANOCOMPOSITES"; "4.3.1. Effect of Nanoplatelet Loading"; "4.3.2. Effect of Nanoplatelet Dispersion"; "4.3.3. Effect of Nanoplatelet Aspect Ratio"; "4.3.4. Effect of Nanoplatelet Orientation"; "4.3.5. Control of Nanocomposite Morphology"; "4.4. CONCLUSIONS"; "4.5. ACKNOWLEDGMENTS"; "REFERENCES"; "BARRIER PROPERTIESOF POLYOLEFIN NANOCOMPOSITES"; "ABSTRACT"; "5.1. INTRODUCTION"; "5.2. BARRIER PROPERTIES OF POLYOLEFINNANOCOMPOSITES: EFFECT OF COMPATIBILIZER"; "5.3. ROLE OF OPTIMUM CLAY MODIFICATION"

---

## Sommario/riassunto

Polymer nanocomposites are organic-inorganic hybrids where the high aspect ratio inorganic filler can be delaminated in the organic matrix at the nanometer scale, thus leading to significant enhancement of composite properties at very low filler volume fractions. With the advancement of polymer nanocomposites technology, significant enhancements in mechanical and thermal properties of the composites could be achieved. However, other important properties like gas barrier properties, which form an absolutely necessary requirement for the use of materials in packaging and storage applications, were relatively neglected. By improving the barrier performance of the materials by incorporation of high aspect ratio nano platelets, one can expect to reduce the thickness of the commercial packaging laminates and other materials where thick material is required to be used to provide barrier to various gases. This can thus lead to significant amount of savings in the material costs and can make the polymer materials more light and also transparent as the nano scale dispersed filler would not scatter light. This book examines the factors affecting barrier properties enhancement in polar polymer matrices, which are different from case when non polar polymers are involved, thus indicating that the performance has to be quantised by case-by-case basis. The commonly used conventional models for prediction of permeation reduction are also less representative of the true microstructure of the nanocomposites. Thus the barrier performance of the polymer nanocomposite materials is also explored, separate from the more bulk based mechanical properties.

---