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Titolo	Ágora
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3. Record Nr.	UNINA9910813882603321
Autore	Bai Yu
Titolo	High temperature performance of polymer composites / / Yu Bai and Thomas Keller
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Descrizione fisica	1 online resource (247 p.)
Altri autori (Persone)	KellerThomas
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Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
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Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references at the end of each chapters and index.
Nota di contenuto	High Temperature Performance of Polymer Composites; Contents; Preface; Chapter 1 Introduction; 1.1 Background; 1.2 FRP Materials and Processing; 1.2.1 FRP Materials; 1.2.2 Processing Technologies; 1.3 FRP Structures; 1.3.1 Pontresina Bridge; 1.3.2 Eyecatcher Building; 1.3.3 Novartis Main Gate Building; 1.4 Structural Fire Safety; 1.4.1 Possible Fire Threats; 1.4.2 Building Fire Standards; 1.5 Summary; References; Chapter 2 Material States of FRP Composites under Elevated and High Temperatures; 2.1 Introduction; 2.2 Glass Transition; 2.2.1 Characterization; 2.2.2 Glass-Transition Temperature 2.2.3 Frequency Dependence of Glass-Transition Temperature 2.2.4 Heating Rate Dependence of Glass-Transition Temperature; 2.2.5 Modeling of Glass Transition; 2.3 Leathery-to-Rubbery Transition; 2.4 Decomposition; 2.4.1 Characterization; 2.4.2 Decomposition Temperature; 2.4.3 Modeling of Decomposition; 2.5 Summary; References; Chapter 3 Effective Properties of Material Mixtures; 3.1 Introduction; 3.2 Volume Fraction of Material State; 3.2.1 General Case

- n Elementary Processes; 3.2.2 Two Processes - Glass Transition and Decomposition; 3.3 Statistical Distribution Functions  
3.3.1 In Cases of Two Material States3.3.2 In Cases of Three Material States; 3.4 Estimated Effective Properties; 3.5 Summary; References; Chapter 4 Thermophysical Properties of FRP Composites; 4.1 Introduction; 4.2 Change of Mass; 4.2.1 Decomposition Model; 4.2.2 TGA; 4.2.3 Estimation of Kinetic Parameters; 4.2.3.1 Friedman Method; 4.2.3.2 Kissinger Method; 4.2.3.3 Ozawa Method; 4.2.3.4 Comparison; 4.2.4 Mass Loss; 4.3 Thermal Conductivity; 4.3.1 Formulation of Basic Equations; 4.3.2 Estimation of  $k_b$  and  $k_a$ ; 4.3.3 Comparison to Other Models; 4.4 Specific Heat Capacity  
4.4.1 Formulation of Basic Equations4.4.2 Estimation of  $C_p,b$  and  $C_p,a$ ; 4.4.3 Decomposition Heat,  $C_d$ ; 4.4.4 Moisture Evaporation; 4.4.5 Comparison of Modeling and Experimental Results; 4.5 Time Dependence of Thermophysical Properties; 4.5.1 Introduction; 4.5.2 Influence of Heating Rates on Decomposition and Mass Transfer; 4.5.3 Influence on Effective Specific Heat Capacity; 4.5.4 Influence on Effective Thermal Conductivity; 4.6 Summary; References; Chapter 5 Thermomechanical Properties of FRP Composites; 5.1 Introduction; 5.2 Elastic and Shear Modulus; 5.2.1 Overview of Existing Models  
5.2.2 Estimation of Kinetic Parameters5.2.3 Modeling of E-Modulus; 5.2.4 Modeling of G-Modulus; 5.3 Effective Coefficient of Thermal Expansion; 5.4 Strength; 5.4.1 Shear Strength; 5.4.2 Tensile Strength; 5.4.3 Compressive Strength; 5.5 Summary; References; Chapter 6 Thermal Responses of FRP Composites; 6.1 Introduction; 6.2 Full-Scale Cellular Beam Experiments; 6.2.1 Material Details; 6.2.2 Specimen and Instrumentation; 6.2.3 Experimental Setup and Procedure; 6.2.4 Experimental Observation; 6.2.5 Thermal Response from Measurements; 6.2.6 Discussion  
6.3 Thermal Response Modeling of Beam Experiments

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#### Sommario/riassunto

The authors explain the changes in the thermophysical and thermomechanical properties of polymer composites under elevated temperatures and fire conditions. Using microscale physical and chemical concepts they allow researchers to find reliable solutions to their engineering needs on the macroscale. In a unique combination of experimental results and quantitative models, a framework is developed to realistically predict the behavior of a variety of polymeric materials over a wide range of thermal and mechanical loads. In addition, the authors treat worst-case scenarios, presenting heat-protect

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