

Optical 3D-Spectroscopy for Astronomy

Roland Bacon and Guy Monnet

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This book reviews the variants of three-dimensional (3D) spectroscopy techniques utilized in astronomy, although many of the topics are highly relevant to small-scale and earth-based spectroscopy applications as well. Of important note, the authors place their emphasis on the use of spectroscopy in the range of 300–2400 nm.

The book is split into two main sections: instrumentation and application of 3D spectroscopy. Chapter 1 opens with a discussion on the properties of optical components important to spectroscopy, which should be of interest to any spectroscopist. Chapter 2 delves into multi-object spectroscopy, which is a popular technique for spectroscopy through-the-telescope. Originally used for surveying multiple stars and galaxies at once, it is now employed for studying dark energy. Chapter 3 focuses on scanning spectroscopy, including discussion on Fourier transform and Fabry–Perot spectroscopy. Chapters 4 and 5 review the designs and trends

in integral field spectroscopy, which is simply hyperspectral imaging by another name. Finally, chapters 6 and 7 compare the aforementioned techniques and discuss the future of 3D spectroscopy in astronomy. All of these topics are covered with sufficient depth, and the authors provide an authoritative explanation of the theory and applications of spectroscopy.

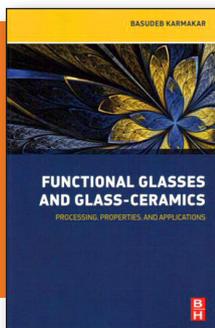
In Part II, the authors shift their focus to data and the impact of the atmosphere on data collection. Chapter 10 is intriguing, as it discusses data collection strategies. Astronomers have to consider the sun and weather when planning an experiment, but they must also keep in mind the variables that any spectroscopist is concerned with: noise, exposure time, and calibration. Chapters 11 and 12 focus on data handling and data analysis. These two chapters provide a very brief overview of analysis techniques and software packages that are available; they do not provide extensive details or mathematical insights

into the actual analyses. For readers interested in detailed instructions on how to analyze spectroscopy data, the authors provide suggestions for other books on those topics.

From an aesthetic point of view, this book is well designed. Figures are informative, interesting, and colorful. Appropriate equations are included, and the authors do not overwhelm the reader with too much mathematics. Most chapters conclude with a series of thoughtful homework exercises with answers provided. The writing is very conversational in tone, making the content readable for specialists and nonspecialists alike. Finally, the references are adequate and up to date.

This book provides a wealth of information for anyone with a basic understanding of spectroscopy who is looking to dig a little deeper, or for anyone who is interested in using spectroscopy for astronomy or remote sensing purposes. This book could be used as a spectroscopy textbook or as an astronomy instrumentation text at the graduate level or senior undergraduate level, but instructors should keep in mind that the chapters on data analysis do not go into as much depth as the chapters in the first half of the book.

Reviewer: *Anthony Stender* is an assistant professor of analytical chemistry at Ohio University, USA.



Functional Glasses and Glass-Ceramics: Processing, Properties, and Applications

Basudeb Karmakar

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Functional glasses and glass-ceramics perform specific functions that are used to accomplish specific application needs or intelligent actions, according to the author. This book covers a wide range of materials synthesis, property

evaluation, and applications for functional glasses and glass-ceramics and is organized into three main parts.

The first part of the book is an introduction to functional glasses and glass-ceramics. In sequence, chapter

by chapter, a detailed description is provided for several glass and glass-ceramic systems, specific processing techniques, and applications. The second part of the book is an extensive and detailed description of functionalized oxide glasses and glass-ceramics.

Chapter 1 starts with basic concepts and the structure–property correlation of glasses and glass-ceramics, and ends with the classification of functional glasses and glass-ceramics and the outlook for these materials. Chapter 2 provides theoretical considerations, synthesis, processing, properties, and applications of glasses and glass-ceramics, ranging from