DESCRIPTION

“The story is told by THE inventor-pioneer-master in the field and is accompanied by amazing illustrations… [it] will become an absolute reference and a best seller in chemistry!” Alberto Credi

“… the great opus on the mechanical bond. A most impressive undertaking!” Jean-Marie Lehn

Congratulations to co-author J. Fraser Stoddart, a 2016 Nobel Laureate in Chemistry.

In molecules, the mechanical bond is not shared between atoms—it is a bond that arises when molecular entities become entangled in space. Just as supermolecules are held together by supramolecular interactions, mechanomolecules, such as catenanes and rotaxanes, are maintained by mechanical bonds. This emergent bond endows mechanomolecules with a whole suite of novel properties relating to both form and function. They hold unlimited promise for countless applications, ranging from their presence in molecular devices and electronics to their involvement in remarkably advanced functional materials. *The Nature of the Mechanical Bond* is a comprehensive review of much of the contemporary literature on the mechanical bond, accessible to newcomers and veterans alike. Topics covered include:

- Supramolecular, covalent, and statistical approaches to the formation of entanglements that underpin mechanical bonds in molecules and macromolecules
- Kinetically and thermodynamically controlled strategies for synthesizing mechanomolecules
- Chemical topology, molecular architectures, polymers, crystals, and materials with mechanical bonds
• The stereochemistry of the mechanical bond (mechanostereochemistry), including the novel types of dynamic and static isomerism and chirality that emerge in mechanomolecules

• Artificial molecular switches and machines based on the large-amplitude translational and rotational motions expressed by suitably designed catenanes and rotaxanes.

This contemporary and highly interdisciplinary field is summarized in a visually appealing, image-driven format, with more than 800 illustrations covering both fundamental and applied research. *The Nature of the Mechanical Bond* is a must-read for everyone, from students to experienced researchers, with an interest in chemistry’s latest and most non-canonical bond.

Read the Preface

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**ABOUT THE AUTHOR**

**Carson J. Bruns** is a Miller Research Fellow in the College of Chemistry at the University of California, Berkeley. He attended Luther College (2004–2008) where he earned degrees in chemistry, religion, and mathematics. He received a PhD in organic chemistry from Northwestern University (2008–2013), where he was a National Science Foundation (NSF) Graduate Research Fellow. Researching in the United States, Thailand, Korea, and Japan, he has co-authored more than 30 publications which have collectively been cited more than 1000 times. His research interests span all aspects of the mechanical bond, from fundamental science to applied chemical technologies.

**J. Fraser Stoddart** is a Board of Trustees Professor of Chemistry at Northwestern University. By playing a major role in introducing the mechanical bond into molecules, he is one of the few contemporary chemists to have contributed to the opening up of an entirely new field of chemistry. He has pioneered the development of bistable mechanically interlocked molecules (MIMs) for use in molecular electronic devices and drug delivery vehicles. In 2016 he shared the Nobel Prize in Chemistry with Jean-Pierre Sauvage and Ben Feringa for the design and synthesis of molecular machines.

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