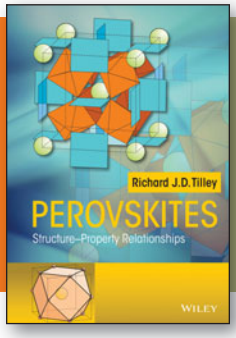
axiomatization of set theory was as challenging as finding optimal conditions for blowing up high explosives. Von Kármán provided theoretical foundations for building bridges and also for constructing the best bomber aircraft. Wigner created the most elegant theories on the atomic nucleus and also directed engineers to build the world's first nuclear reactors. Szilard transferred his pioneering information theory to the concept of nuclear chain reaction and the critical mass. Teller was first a materials scientist, then a nuclear physicist, shifting his focus from fission to fusion.

All of them participated substantially to the discovery, design, and building of the atomic bomb. They were also deeply involved in politics, particularly during the Cold War, by strongly sustaining the need for weapons supremacy of the United States and being active members of the decision-making groups of the American security system. The Martians stressed that the time element was more crucial here than in fundamental research. They contributed to the recognition of science as a deciding factor on the national and international scene, thus leading to a massive increase of the influence of scientists in government and industry.

After World War II, the United States decided to keep nuclear science secret but to allow computer science to become public. According to von Neumann, this led to surprising results: "Nuclear matters remained classified, but espionage transmitted a great deal of vital information from this area to the Soviets, and the Soviet Union caught up soon with the United States. In contrast, there was less classification in computer science, yet the Soviet Union stayed behind eternally in this area." Von Neumann's observations are still confirmed today.

Reviewer: Aurelia Meghea *is Emeritus Professor at the University Politehnica of Bucharest, Romania.*



Perovskites: Structure–Property Relationships

Richard J.D. Tilley

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Perovskite is a mineral with formula $CaTiO_3$ and has given its name to a family of compounds that have a general formula ABX_3, where A and B are usually large cations, and medium-sized cation X is an anion. These compounds have a variety of physical and structural properties that lead to a plethora of applications. Recently, hybrid perovskites have also attracted attention due to their photovoltaic applications. Novel phenomena at artificial heterointerfaces have also become scientifically interesting. Hence, an up-to-date review of the literature in this area is needed and is the subject of this book, which is organized into nine chapters.

Chapter 1 deals with the description of the ABX_3 perovskite structure and the idealized composition: $SrTiO_3$. The possible variants such as cation displacement, Jahn–Teller distortion, and octahedral tilts are clearly explained and well illustrated with examples. Symmetry relationships and hybrid inorganic perovskites are also briefly addressed.

Chapter 2 describes related structures such as double perovskites, nitrides, and A-site-deficient and anion-deficient phases. In each case, the modifications of structure with respect to the ideal perovskite are simply explained, and many structures are nicely drawn with recent examples. Chapter 3 deals with hexagonal perovskites, where the structures have hexagonal instead of cubic close packing of AX_3 layers. The chapter lists several types of packing, including the $BaNiO_3$ hexagonal ideal structure. Chapter 4 presents modular structures. The first part is related to the description of various perovskite structures and gives well-known examples such as Ruddlesden–Popper or layered cuprate phases. The idealized structures are nicely drawn, and tables contain the crystallographic information.

The last five chapters concern the physical properties of perovskites. Chapter 5 focuses on the diffusion and ionic conductivity properties. After some mathematical definitions, the manipulation with defects of such properties is explained before introducing recent work on solid-oxide fuel cells. The dielectric and ferroelectric properties presented in chapter 6 are classical but are illustrated by recent results such as $BiFeO_3$ compounds or improper ferroelectricity. Chapter 7 discusses magnetic properties. Basic concepts are introduced, and typical behaviors (spin glass, control spins) are explained using recent examples. Discussions of multiferroic perovskites end this chapter.

Chapter 8 covers electronic conductivity. The chapter starts with the band-structure approach, and then discusses several concepts associated with electrical properties, such as semiconductors, the metal–insulator transition, high-T_c cuprates, half-metallicity, charge and orbital ordering, and magnetoresistance. Chapter 9 describes unique thermal and optical properties. Recent results such as the magnetocaloric effect of perovskite solar cells are introduced.

This book is clearly written and easy to read. Many recent references are included. The figures are useful and clear. It is written at an appropriate level for someone with a materials science background. I recommend this book to any research scientist or student in solid-state physics or materials science.

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