

This Week's Citation Classic®

Funke K. AgI-type solid electrolytes. *Prog. Solid State Chem.* 11:345-402, 1976.
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This paper reviewed the structural, thermodynamic, and dynamic properties of AgI-type solid electrolytes. The discussion of the dynamics of the fast ionic motion was based on experimental data on the ionic conductivities and diffusivity, on the complex conductivity at microwave and far-infrared frequencies, and on Raman and quasielastic neutron scattering spectra. [The SC7® indicates that this paper has been cited in over 170 publications.]

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When I came to the University of Göttingen as a freshman in 1963, Wilhelm Jost was the Ordinarius of Physical Chemistry. He was working and teaching at the institute founded by Walther H. Nernst in 1895-1896. Jost was very well aware of the roots and the tradition of science, especially physical chemistry, in Germany.¹ On the other hand, he was amazingly imaginative and sensitive with regard to new turns and directions important developments in science might take. So he was the first to realize that the cationic motion in the prototype solid electrolyte, α -AgI, whose unusual properties had been discovered by C. Tubandt and E. Lorenz in 1914,² should give rise to interesting features in the microwave frequency range.³ This idea triggered my doctoral thesis under Jost, my further work on the dynamics of solid ionic conductors, and, in particular, my review paper on AgI-type solid electrolytes.

In the late 1960s and even in the early 1970s, highly conducting solid electrolytes like α -AgI were still widely considered a curiosity rather than a potentially important class of materials with useful technical applications. Terms like "superionic conductors" and "solid state ionics" had not yet been invented. In view of a continuously increasing interest in the field, however, a review article on AgI-type solid electrolytes was certainly due by the mid-1970s.

At that time I was an assistant to Jost, pursuing the goal of *habilitation*, which is the traditional German procedure required for obtaining the right to give lectures. It goes without saying that the matter was never touched upon in the presence of Jost. Therefore, the prospects of my scientific future were quite uncertain to me. In this situation, Hermann Schmalzried, Carl Wagner's last student, proposed that I, Jost's last student, should write the review paper that has now become a *Citation Classic*. The purpose of the proposition was twofold, including the side effect that a German translation should serve as *Habilitationschrift*. Indeed, everything went well. Writing this commentary now gives me a welcome opportunity to thank both Jost and Schmalzried.

During the decade from 1975 to 1985 the field of solid electrolytes expanded at a remarkable pace, attracting an increasing number of workers in science and technology. International conferences were organized and have since been held at regular two-year intervals. The journal *Solid State Ionics* was founded in 1979, and I have had the pleasure of being a member of the board of editors since that time.

In conclusion, the frequent citation of my review paper is easy to explain because of its timeliness and the rapid development of solid-state ionics. Included in the references is an updated version of the main topic of the paper: the dynamics of the elementary steps of the mobile ions in AgI-type solid electrolytes.⁴

1. Jost W. The first 45 years of physical chemistry in Germany. *Annu. Rev. Phys. Chem.* 17:1-14, 1966. (Cited 5 times.)
2. Tubandt C & Lorenz E. Molekularzustand und elektrisches Leitvermögen kristallisierter Salze (Molecular state and conductivity of crystallized salt). *Z. Phys. Chem.* 87:513-42, 1914. (Cited 120 times since 1955.)
3. Jost W. Reaktionen unter extremen Bedingungen (Reactions under extreme conditions). *Ber. Bunsen Ges. Phys. Chem.* 71:753-5, 1967. (Cited 5 times.)
4. Funke K. Fast ion dynamics studied by neutron scattering and high frequency conductivity. (Laskar A L & Chandra S, eds.) *Superionic solids and solid electrolytes: recent trends*. New York: Academic Press, 1988.