done on thin films and discusses what is known about their structure. A good description is also given of the formation of thin films in the laboratory. The main part is given over to the optical properties of thin films: the calculation of their optical properties and the measurement of optical constants. It is most valuable to have all these arts and techniques assembled in one place, both for the specialists in thin film optics and for the physicists who may need to prepare and calculate thin film depositions for his particular research application.

Static and Dynamic Electron Optics. By P. A. Sturrock. 240 pp. Cambridge University Press, New York, 1955. $5.50. *Reviewed by L. Marton and H. Mendlowitz, National Bureau of Standards.*

There are a number of previous texts in English on electron optics, but this is the first that is devoted completely to theoretical electron optics. Although the title might imply that the subject matter is limited to electron optics only, there are some applications made to the optics of charged particles other than electrons, especially in the case of high-energy machines.

The author divides his presentation of the subject into two main topics. The first is a study of static electron optics (time independent fields) and the second investigates dynamic electron optics (time dependent fields). The treatment of the latter topic is the first appearing in an English language textbook and is a welcome addition to the literature.

The treatment of the various problems in electron optics can be best described as an elegant approach to classical mechanics which employs the variational principles and those convenient functions derived from them. The author obtains from the Hamilton-Jacobi approach to mechanics all the required information germane to geometrical electron optics. This is accomplished via the parallelism to Fermat's principle in light optics. He shows the relation of the canonical momentum of the particle to the refractive index in light. The treatment of particle accelerators (where the fields vary with time) is actually carried through by extending the author's elegant method on static field optics. The time coordinate is not considered as an independent parameter, as is usually done, but is treated as a dependent variable which is a function of the distance along the trajectory. In this manner, he goes on to discuss the high-energy machines such as synchrotrons, linear accelerators, and the strong focusing devices.

The book is offered to all interested in electron (and charged particle) optics, but because of the elegant treatment of the various problems, only those who are interested in and somewhat familiar with the Hamilton-Jacobi approach in classical mechanics will find that they can utilize the methods in the book without a great deal of effort. The average experimentalist interested in the design of an electron microscope lens or a beta-ray spectrograph will not find that he can immediately translate the formulas in the text to his usual routine design parameters without familiarizing himself with this new approach given by the author. In some cases the reader might find some parts of the text difficult because of the "frugal-style" of the author. Elaboration on difficult points and repetition of terminology can, in some cases, be more of a virtue than a vice, especially in dealing with symbols which can sometimes be interpreted as variational operators or as differential operators.

In summary, we feel we can recommend the book to the theoretical worker in electron optics because it gives the author's approach to various problems which have been dealt with elsewhere, for the most part, in a different manner. In the static field case, many of the field properties are discussed by others in optical terms such as aberrations and focal distances, etc. In the case of time-dependent fields, the parameters are discussed elsewhere in mechanical terms such as orbit, stability, oscillations, etc. The author treats both problems in a somewhat similar fashion in terms of parameters which are derived from his "characteristic functions". His examples on beta-ray spectrographs and on the high-energy machines help bridge the gap between the various approaches.

The printing and binding of the book are good examples of the outstanding craftsmanship which we expect from Cambridge University Press.

Lentilles Electroniques (in French). Volume 1 of Optique Electronique. By P. Grivet, M. Y. Bernard, and A. Septier. 184 pp. Bordas, France, 1955. Paperbound. *Reviewed by Charles J. Cook, Stanford Research Institute.*

Lentilles Electroniques, first of a three volume set which embraces the field of particle accelerators, mass and velocity analysers, microscopes, etc., is restricted to a discussion of the optical properties of electrostatic and magnetic lenses.

After introducing the general components and operating techniques of electrostatic electron microscopes, the authors present practical experimental methods used to plot the fields of electrostatic and magnetic lenses. The body of the text, however, is devoted to the optical properties of these lenses. The rules of geometrical optics are developed for both types of lenses. The similarities and differences between optical glass lenses and charged particle lenses are pointed out in a most interesting and illuminating chapter. Then, after a rather complete consideration of the aberrations and distortions introduced by various systems, the properties of some of the more popular symmetrical lenses are discussed. The final short chapter introduces strong focusing.

The text is written in a freely flowing style that is easy to read, and is evolved in a manner that imparts a very strong feeling of intimate familiarity with each subject discussed. This impression probably stems from the successful integration of the theory underlying charged particle lenses with corresponding experimental results and practical lens applications. Each subject