This Week's Citation Classic

CC/NUMBER 21
MAY 26, 1980

Jona F. Low-energy electron diffraction (LEED) spectra: aluminum.
IBM J. Res. Develop, **14**:444-52, 1970.
[IBM Thomas J. Watson Res. Center, Yorktown Heights, and Dept. Materials Science, State Univ. New York, Stony Brook, NY|

The intensities of low-energy electron beams specularly and nonspecularly diffracted from {100}, {110} and {111} surfaces of aluminum have been measured as functions of electron energy and angles of incidence. Several normalized spectra are presented, and the procedures followed in aligning the sample, reducing magnetic fields, and collecting and normalizing the data are described. [The *SCI*® indicates that this paper has been cited over 80 times since 1970.]

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December 28, 1979

"In the middle and late sixties there was a marked revival of interest in low-energy electron diffraction, soon to be abbreviated as LEED. The technique was made experimentally attractive by the realization, by the Bell Telephone workers, of Ehrenberg's old idea of post-diffraction acceleration.[1] The availability of ultra-high vacuum facilities and the need for surface-sensitive tools were the other two ingredients that made the classic Davisson-Germer experiment popular again.[2] Nevertheless, LEED remained a qualitative, at best a semi-quantitative technique. People used it to determine the symmetries and the periodicities of surface structures, but the atomic arrangements were left to speculations. In 1967 a group of scientists, mostly theorists, gathered at Brooklyn Poly to start what was to become a series of 'LEED Theory Seminars.' The purpose of these seminars was to develop a dynamical theory of LEED that would enable one to determine the atomic arrangements on crystal surfaces by means of quantitative analysis of LEED intensities.

"In those days, I was working at the IBM Research Center in Yorktown Heights. I had learned how to prepare clean surfaces of several metals and semiconductors, and how to interpret LEED patterns qualitatively, but I felt that the real power of LEED lay in the quantitative determination of surface structures. I had bothered repeatedly my good friends Don Jepsen and Paul Marcus, at the IBM lab, with questions and comments because I knew that the problem required the help of gifted theorists. I attended the Brooklyn Poly meeting with Don and Paul, and in 1968 I drove with Don to Ithaca to attend the second LEED Theory Seminar at Cornell University.

"It soon became obvious to me that while the theorists were busy developing the theoretical tools for surface structure analysis, the experimentalists should have been busy developing methods and procedures for the collection of LEED intensity data suitable for such analysis There were, at the time, no rules for the collection of LEED data, and no idea of what would constitute a meaningful set of such data. I decided to develop some rules myself, and to exploit the fact that I had just learned how to clean aluminum surfaces. I assembled a body of data on three surfaces of aluminum, {100},{110}and {111}, and thought I would make them available to the community of LEED theorists so that they could test their calculations. I decided to try to advertise the availability of such data in a public meeting, and to present a talk that would subject my freshly developed procedures to the criticism of fellow workers I submitted an abstract for a talk on the subject to the Physical Electronic Conference that was to be held at Yale in 1969. The abstract was rejected. I was, therefore, left with the alternative of publishing at least some of the data in a suitable journal. The problem was to find a willing one, because journals are very stingy with space and would certainly raise objections to a large paper presenting a lot of data, requiring many pages for a large number of figures and discussing nothing but the procedures followed for taking the data. I was very fortunate to find that the *IBM journal* was willing to consider an article of mine on this subject ."

1. **Ehrenberg W.** A new method of investigating the diffraction of slow electrons by crystals. *Phil. Mag.* **18**:878-901, 1934.
2. **Davisson C J & Germer L H.** Diffraction of electrons by a crystal of nickel. *Phys. Rev.* **30**: 705-40, l927.