14.X-10 THE ATOMIC STRUCTURE OF SILICON AND GERMANIUM SURFACES. By F. Jona, Department of Materials Science and Engineering, State University of New York, Stony Brook, New York.

After a brief tutorial introduction into the methods and procedures of LEED crystallography, the problem of determining the atomic structure of silicon and germanium surfaces will be discussed. The rise and fall of several structural models proposed during the past 20 years for the (100) and (111) surfaces will be examined in order to explain the present situation in the field. The (111) surfaces is still a popular object of undemonstrable model speculations, but the (100) surface is now understood with considerable confidence if not in detail at least in its broadest outlines.

14.X-11 DETERMINATION OF THE STRUCTURE OF MOLECULES ADSORBED ON SURFACES BY LEED. By A. Ignatiev, Department of Physics, University of Texas, Houston, Texas.

LEED Determination of the atomic structure of molecules adsorbed on surfaces is complicated over that of the case of atomic adsorbates by not only the requirement of molecular integrity within the course of the experiment, but also by the additional orientational theoretical model. As a result, only a relatively few molecule adsorbate systems have been thoroughly studied by LEED. These include the simple CO and NO molecules adsorbed on nickel where the problems of molecular integrity and sensitivity to molecular structure have been overcome. Optimism for future determination of the structure of larger molecules adsorbed on surfaces is seen by recent theoretical LEED calculations of surface adsorbed molecular benzene. The surface structure of the above noted systems will be discussed.

14.X-12 DETERMINATION OF THE DEFECT STRUCTURE OF SURFACES AND OVERLAYERS USING LOW ENERGY ELECTRON DIFFRACTION. By M.G. Lagally, Department of Metallurgical and Mining Engineering and Materials Science Center, University of Wisconsin, Madison, Wisconsin.

Structural defects in surfaces or adsorbed films significantly affect surface and interface chemical, mechanical, and electrical properties and consequently the processes or technologies that depend on them. Bulk defects are usually investigated by high energy electron or X-ray diffraction. Recently various surface defects have been characterized using low energy diffraction (LEED), by applying and expanding upon analytical techniques first developed for X-ray diffraction. Types of defects that can presently be characterized by studying their influence on the LEED beam profiles include mosaic size and orientation, surface steps, strain in a surface or film, slip planes at surfaces, finite size effects in overlayer growth, and antiphase boundary effects in overlayers. The analysis of these surface defects using LEED is described. In addition, some effects of surface and overlayer defects on kinetic and thermodynamic processes at a surface and on the accurate determination of equilibrium positions of adsorbed atoms will be discussed.

14.X-13 THE SURFACE CRYSTALLOGRAPHY OF HYDROCARBON MOLECULES ADSORBED ON THE PLATINUM AND RHODIUM (111) SURFACES. By G.A. Somorjai and M.A. Van Hove, Department of Chemistry, University of California, Berkeley, California.

Surface crystallography studies with LEED reveal the formation of several ordered structures of ocetylene, ethylene, propylene, and butenes on the (111) crystal faces of platinum and rhodium. Order-order phase transformations occur as a function of temperature leading to decomposition of the molecules above 100°C. The most stable molecular configuration appears to be species with their C-C bond that is closest to the metal atoms, perpendicular or at some angle to the metal surface. Correlations between results by LEED and electron loss spectroscopy studies will be presented.