

X. TRANSPORT PHENOMENA IN SOLIDS

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RESEARCH OBJECTIVES AND SUMMARY OF RESEARCH

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We are studying thermal transport in germanium single crystals. Both bulk transport phenomena and surface boundary layer thermal conductance effects are being explored experimentally and theoretically. In the experiments we use ballistic heat pulses with superconducting bolometer detectors, or the electrical impedance of thin-film bolometers, which may be interpreted to yield a value for the boundary layer thermal conductance. In particular, we are studying the effect of impurities on the bulk phonon transport properties and the effect of surface preparation on the thermal boundary layer conductance. Heat pulse techniques also appear to be particularly useful in studying the effect of minibands, produced by superlattices in single crystals, on transport properties of the crystal. We are trying to obtain a suitable crystal with superlattice structure and to design appropriate experiments to study the effects.

