

ID: 12.1a

Title: Ferroelectricity in Perovskites

Name: Singh, David

Affiliation: Oak Ridge National Laboratory

Perovskite materials display a wide variety of physically interesting and useful behaviors. One of the key applications is as dielectrics, especially ferroelectrics and relaxor ferroelectrics. These are used in a wide variety of applications, including ceramic capacitors, memory devices, transducers, and microwave systems. The functionality of these materials depends on a delicate balance between different lattice instabilities of the ideal cubic perovskite structure. Considerable understanding of this interplay comes from first principles studies of these materials. Here I discuss these instabilities and their microscopic origins, emphasizing rules that can be used to find new compositions. While this is an old field, some new directions emerge, including the use of disorder as a chemical knob for changing properties. The possibility of obtaining new useful compositions based on this is explored and new directions are suggested. This work was supported by the Department of Energy, Office of Basic Energy Sciences, Materials Sciences and Engineering Division.