Abstract for an Invited Paper
for the MAR09 Meeting of
The American Physical Society

**Thermoelectricity in oxides and weakly coupled single molecules**

SUBROTO MUKERJEE, University of California, Berkeley

Complex oxides have emerged as promising candidate materials for thermoelectric and energy applications. The study of charge and heat transport in these systems is also very interesting and important from the point of view of fundamental physics. We show that oxides in the narrow-bandwidth limit have high values of the thermopower and power factor and also violate the Wiedemann-Franz law yielding high values of the electronic part of the figure of merit. These theoretical results agree with the data on $Na_xCoO_2$. We argue that in another oxide $Sr_{1-x}La_xTiO_{3-\delta}$, a large effective mass (small bandwidth) band appears due to oxygen vacancies, which can be exploited for thermoelectric applications and comment on recent experiments. Finally, we show that there are commonalities in the thermoelectric behavior of narrow bandwidth oxides and weakly coupled single molecules. The latter systems also offer promise as thermolectric materials due to the possibility of large values of thermopower and we comment on the limiting effect of phonons on their figures of merit.