Charge density wave formation and physical properties of $R_2\text{Te}_5$ ($R=\text{Nd, Gd}$) compounds

K.Y. SHIN, N. RU., Geballe Laboratory for Advanced Materials and Department of Applied Physics, Stanford University, Stanford, California 94305, USA, M.F. TONEY, Stanford Synchrotron Radiation Laboratory, Stanford Linear Accelerator Center, 2575 Sand Hill Road, Menlo Park, California 94025, USA, I.R. FISHER, Geballe Laboratory for Advanced Materials and Department of Applied Physics, Stanford University, Stanford, California 94305, USA — $R_2\text{Te}_5$ ($R=\text{Nd, Gd}$) has a layered tetragonal structure based on alternating single and double square planar Te sheets separated by corrugated $R\text{Te}$ layers, and has a quasi-two dimensional electronic structure. The material shares important physical properties with other two single and double Te layer variants, $R\text{Te}_2$ and $R\text{Te}_3$ ($R=\text{La Yb}$), including a charge density wave (CDW) instability. Using a binary self-flux method, we have grown high-quality single crystals of Gd$_2\text{Te}_5$ and Nd$_2\text{Te}_5$ compounds and have characterized their structural, thermodynamic and transport properties. Our measurements reveal, for the first time, the charge density wave in this material. We will discuss the properties and origin of the CDW, and the relation to the better known $R\text{Te}_2$ and $R\text{Te}_3$ compounds.

$^1$This work is supported by the DOE, Office of Basic Energy Sciences, under Contract No. DE-AC03-76SF00515.

Kyungyun Shin
Geballe Laboratory for Advanced Materials and Department of Applied Physics, Stanford University

Date submitted: 25 Nov 2006

Electronic form version 1.4