Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Sun Oven Grown Cuprates Superconductivity and Periodic Lattice Distortions PLD[1] JUANA V. ACRIVOS, San Jose State University, J.G. CHIDVINADZE, Andronikashvili Institute Tbilisi, D.D. GULANOVA, Sun Physics Acad Sci Uzbekistan, D. LOY, San Jose State University — $Bi_{1.7}Pb_{0.3}Sr_2Ca_{n-1}Cu_nO_{4+2n+\delta}$ identified by the layer heavy element composition with substitution, s (2_s:2:n-1:n$\geq$2) cuprates grown by green chemistry, transition temperatures to superconductivity T_c=87 to 150K are related to their structure. Enhanced XRD at energies near but below the Cu K, and Pb and Bi L3-edges for pure n=2, 3 phases show Darwin shaped preferred [HKL] reflections that identify the magnitude of the allowed transition moment from the core state to extended unoccupied states determined by the electron density symmetry in that plane, confirmed by XAS of 3μm thick films. Weak PLD are still detected, but the stability gained by substitution of Bi by Pb is the formation of nearly symmetric Pb_8 cubes in $(2_s$:2:1:2$)_{13}$and $(2_s$:2:2:3$)_{17}$ super-lattices. The preferred 2D [HKL] reflection planes play the same role in the chemical activity of 3D solids as the linear bonds do in molecular reactions, governed by scattering dependent on the electron density symmetry in their highest and lowest unoccupied states.

[1]Supported by US NSF, Dreyfus, DOE Laboratories SSRL-SLAC, STUC-Ukraine and Georgia NSF.

Juana V. Acrivos
San Jose' State University

Date submitted: 30 Nov 2010 Electronic form version 1.4