Abstract

We have studied the thermodynamic properties of electron doped Niodium Cellenium Copper Oxide (Nd2-xCexCuO4 -NCCO) and Praseodymium Cellenium Copper Oxide (Pr2-xCexCuO4-PCCO) and hole doped Yitrium Barium Copper Oxide (YBa2CuO7-YBCO) and Lanthanum Strontium Copper Oxide (La2-xSrxCuO4- LSCO) within the framework of modified Bose-Fermi-Hubbard model in the strong coupling limit where U/t=12. The total energy of the system increases exponentially with the temperature which is attributed to increased thermal fluctuations thus enhancing the conduction electrons. At lower temperatures, entropy increases exponentially and corresponds to ~3.1 ×10-3 eV/K2 for YBCO and ~3.2 ×10-3 eV/K2 for LSCO occurring respectively at 297 K and 239 K is noted. At 200 K, NCCO and PCCO have numerical entropies of ~3.097 ×10-3 eV/K2 and ~2.663 ×10-3 eV/K2 respectively. Apparently, the maximum entropy for electron-doped system is smaller than that of the hole-doped ones indicating that electron-doped PCCO would be preferred for high-TC superconductivity since SC process is a high order process that requires low entropy.