Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Towards enhancing two-dimensional electron gas quantum confinement effects in perovskite oxide heterostructures[1] KESONG YANG, SAFDAR NAZIR, MAZIAR BEHTASH, University of California, San Diego — The two-dimensional electron gas (2DEG) in $LaAlO_3/SrTiO_3$ perovskite-oxide heterostructure has attracted much attention because of its potential applications in nanoelectronic devices. A 2DEG has two landmark characters: strong charge confinement in the third dimension and high electron conductivity in two dimensions. In an ideal 2DEG system, electrons can move freely along the interface but are tightly confined in the *c*-axis that is perpendicular to the interface. Nevertheless, the actual electron gas in the $SrTiO_3$-based perovskite heterostructures is extended a few nanometers along the c-axis into the $SrTiO_3$ substrate, and thus they are also called as quasi-2DEG. Actually, it is a problem of both fundamental and practical interest to achieve an ideal 2DEG via enhancing the lateral quantum confinement effects. By using first-principles electronic structure calculations, herein we proposed two possible approaches to enhance the quantum charge confinement effects by confining the electron gas within one single atomic layer in the perovskite oxide heterostructure.

[1]This work is supported by start-up funds at the University of California, San Diego.

Kesong Yang
University of California, San Diego

Date submitted: 18 Oct 2014 Electronic form version 1.4