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| <b>14. ABSTRACT</b><br>During the final year of the grant, we have demonstrated reversible tunability of coupled phases transitions, including a perpendicular ferromagnetic transition, a metal insulator transition, an optical transition and a structural phase transition, by electrolytic gating of SrIrO <sub>3</sub> /(La,Sr)MnO <sub>3</sub> superlattices. All of these effects are found to exist at room temperature. In addition, we have combined strongly spin-orbit coupled SrIrO <sub>3</sub> with CoFeB to find that we can manipulate the magnetic moments in the ferromagnetic CoFeB layer via microwave charge current in the SrIrO <sub>3</sub> layer. The versatility of the SrIrO <sub>3</sub> layer for a wide range of functionalities make it a promising material for applications of interest to the Air Force.           |  |  |   |   |  |
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