

Abstract Submitted
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In-plane electric polarization of bilayer graphene nanoribbon by interlayer bias voltage RYO OKUGAWA, JUNYA TANAKA, Tokyo Institute of Technology, TAKASHI KORETSUNE, RIKEN Center for Emergent Matter Science, SUSUMU SAITO, SHUICHI MURAKAMI, TIES, Tokyo Institute of Technology — Bilayer graphene nanoribbons are known to show various energy bands depending on the shapes of the edges and the width of the nanoribbons. In particular, the energy bands of the graphene nanoribbons with armchair edges become gapless or gapped when the width changes. We theoretically study a polarization along the ribbon direction induced by an external interlayer bias voltage by using a tight-binding model, when the nanoribbon is insulating. We find that a polarization is induced for armchair-edges but not for zigzag-edges. The polarization shows different behavior depending on the width as well as the bias voltage. When the interlayer bias voltage is weak, the polarization has opposite signs depending on the width modulo three. This difference can be understood by an effective two-band model from the tight-binding model. Furthermore, our *ab initio* calculations also agree with the results. On the other hand, under a strong bias voltage, we find that the polarization takes one-third or zero depending on the width modulo three.

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