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Surface-enhanced Raman scattering of wurtzite-type GaN(0001) and ZnO(0001): CHIH-YI LIU, MYKHAYLO M. DVOYNENKO, TSU-SHIN CHAN, JUEN-KAI WANG, YUH-LIN WANG, INSTITUTE OF ATOMIC AND MOLECULAR SCIENCES, ACADEMIA SINICA, TAIPEI, TAIWAN, REPUBLIC OF CHINA COLLABORATION, CENTER FOR CONDENSED MATTER SCIENCES, NATIONAL TAIWAN UNIVERSITY, TAIPEI, TAIWAN, REPUBLIC OF CHINA COLLABORATION, DEPARTMENT OF PHYSICS, NATIONAL TAIWAN UNIVERSITY, TAIPEI, TAIWAN, REPUBLIC OF CHINA COLLABORATION — We first-time report surface-enhanced Raman scattering (SERS) of Ag-deposited wurtzite-type GaN(0001) epitaxial film and ZnO(0001) substrate. On non-deposited region, two Raman-active modes, A_1(LO) and E_2(high), were observed in backscattering geometry, which is consistent with the Raman selection rule on wurtzite structure. In contrast, on the Ag-deposited region of both samples, only A_1(LO) mode (734 cm^{-1} for GaN and 572 cm^{-1} for ZnO) exhibits clear Raman enhancement. We propose that the macroscopic polarization field accompanied by LO-phonons is responsible for this anomalous Raman enhancement. The study of SERS effect on ionic crystals thus provides a simple test to investigate the mechanism beside electromagnetic effect in enhanced Raman scattering.

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