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### Surface morphology of Al<sub>0.3</sub>Ga<sub>0.7</sub>N/Al<sub>2</sub>O<sub>3</sub>-High Electron Mobility Transistor structure

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**Author(s):** [Corekci S](#) (Coerekci, S.), [Usanmaz D](#) (Usanmaz, D.), [Tekeli Z](#) (Tekeli, Z.), [Cakmak M](#) (Cakmak, M.), [Ozcelik S](#) (Oezcelik, S.), [Ozbay E](#) (Oezbay, E.)

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**Abstract:** We present surface properties of buffer films (AlN and GaN) and Al<sub>0.3</sub>Ga<sub>0.7</sub>N/Al<sub>2</sub>O<sub>3</sub>-High Electron Mobility Transistor (HEMT) structures with/without AlN interlayer grown on High Temperature (HT)AlN buffer/Al<sub>2</sub>O<sub>3</sub> substrate and Al<sub>2</sub>O<sub>3</sub> substrate. We have found that the GaN surface morphology is step-flow in character and the density of dislocations was about 10(8)-10(9) cm(-2). The AFM measurements also exhibited that the presence of atomic steps with large lateral step dimension and the surface of samples was smooth. The lateral step sizes are in the range of 100-250 nm. The typical rms values of HEMT structures were found as 0.27, 0.30, and 0.70 nm. HT-AlN buffer layer can have a significant impact on the surface Morphology of Al<sub>0.3</sub>Ga<sub>0.7</sub>N/Al<sub>2</sub>O<sub>3</sub>-HEMT structures.

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**Addresses:** Cakmak, M (reprint author), Gazi Univ, Dept Phys, TR-06500 Ankara, Turkey  
Gazi Univ, Dept Phys, TR-06500 Ankara, Turkey  
Nanotechnol Res Ctr, Dept Phys, TR-06800 Ankara, Turkey  
Nanotechnol Res Ctr, Dept Elect & Elect Engr, TR-06800 Ankara, Turkey

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