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The interfacial reactions and thermal stability of Pt/p-GaN; the possible Ohmic contact.

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The pre-requisite condition for GaN application to the high power electronic devices is to achieve the Ohmic contact. Since the N vacancy at the GaN interface is known to act as an n-type carrier, it is quite easy to make an Ohmic contact with n-GaN as long as the contacting metal, like Ti, Cr, and Al, form a nitride with N in GaN. On the other hand, such an advantage of n-GaN behaves as a limiting factor to p-GaN Ohmic contact.

In the present study, however, it has been identified by *in-situ* monochromatic x-ray photoelectron spectroscopy (XPS) and scanning Auger microscopy (SAM) that Pt can form the best metal contact to p-GaN, which can be the possible Ohmic contact. From the band bending measurement using Ga 3d, the Schottky barrier height of Pt/p-GaN was 1.97 eV, which is quite close to the ideal Schottky barrier height, 1.85 eV. Furthermore, it was quite amazing result that the starting surface had originally 0.7 eV larger band bending than that of the Pt-covered substrate. From N 1s and Ga core levels, it has been deduced that neither metallic Ga nor nitride is not formed by either Pt deposition or subsequent annealing. From the depth profile obtained by *in-situ* SAM, it has been also deduced that the deposited Pt forms a sharp interface and the subsequent annealing at 500 C for 3 minutes only induces a slight Pt diffusion into the bulk.

Therefore the present result suggests that the critical factor for the excellent Pt/p-GaN originates from the non-disruptive contact of Pt, which does not generates N-vacancies at the interface.

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