**Description of Open Access Data of**

Article Title:

Growth of GaN Epitaxial Films on Polycrystalline Diamond by Metal-organic Vapor Phase Epitaxy

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**Description of data**

All the data used in this article takes the form measurable quantity (dependent variable) versus parameter varied under operator control (independent variable) and is recorded in tabulated form in spreadsheets. Apart from one data set referred to in a “non-quantitative way”, all the data used was presented in the above article in graphical form indicated as figures 1b, 2, 3 etc. The data-containing graphs are:

**Figure 1b in file Fig\_1b\_curvature:**

The bow of both kinds of PD substrates measured by moving a digitally-controlled stylus across the sample surface over a distance of 5 mm and measuring the vertical deflection of the stylus every few microns. The PDA substrate was found to have a convex bow (~1.5 μm over 5 mm) whilst PDB had a concave bow (~6 μm over 5 mm), where convex and concave are defined in the article.

**Figure 2 in file Jiang\_Fig\_2\_xps\_data:**

X-ray photo-electron spectroscopy (XPS): intensity of emitted x-ray photon versus binding energy. These data reveal the nature of the chemical bonds between the elements found on the surface or immediate sub-surface layer of the samples under consideration. This in turn provides information about the chemical nature of the surface on which the III-Nitride layers were grown.

In describing the data in this graph, reference is made to energy dispersive x-ray (EDX) measurements that confirm the presence of both silicon and carbon on the surface of the nominally polycrystalline diamond growth substrates, both in large quantities. Taken together with the chemical bonding information obtained from the XPS measurements (presented in figure 2) it was inferred that almost all the silicon present was bonded chemically to carbon, with some silicon bonded to oxygen.

**Figure 3 in file Jiang\_Fig\_3\_reflectivity:**

These data were collected via in-situ measurements of the intensity of a visible laser beam (typically red light) from the surface of the III-Nitride layers as they were grown using a standard commercially available tool (specified in the article). The independent variable is time.

**Figure 4 in file Jiang\_Fig\_4\_Surface\_MOR:**

The data are images formed by the secondary electron emission, taken by digital camera during inspection of the surface of the grown III-Nitride layer by scanning electron microscopy. The data sets in the form of the intensity reaching each pixel in a two dimensional array of such pixels in the digital camera.

**Figure 5 in file Jiang\_Figs\_5a\_&\_5B\_XRD\_3D:**

These data are the intensity of a diffracted x-ray beam measured by rocking samples 3 and 4 (described in the article, especially in Table 1) when illuminated by a beam of x-rays under conditions that reveal the twist in the III-Nitride layers [beam alignment along crystallographic direction GaN(10-13)] and the tilt [ beam alignment along GaN(0002)].

**Figure 6 in file Jiang\_Fig\_6\_E2H Raman\_comparison\_3D\_growth\_time:**

Raman spectra of Sample 3 and Sample 4 in the vicinity of the E2H phonon mode for two samples to reveal the impact of the duration of the 3-diminsional growth mode on the strain in the GaN epitaxial films.

**Figure 7 in file Jiang\_Fig\_7\_Raman\_comparison of growth on bowed substrates:**

Raman spectra in the vicinity of the E2H phonon mode for (a) Sample 5 grown on a concave PDB substrate and (b) Sample 6 grown on a convex PDA substrate to reveal the impact on the strain in the GaN epitaxial films of the growing the III-Nitride layers on bowed substrate.