

Electrostatic plasma charge interactions and their influence on film and nano-pillar growth

K S A Butcher^{1,2}

¹Meaglow Ltd, Canada

²Macquarie University, Australia

Electrostatic effects are not commonly considered during plasma film growth, however we have recently shown attractive electrostatic interactions between regions of positive charge in RF plasmas and the negative charge of metal wetting layers can strongly influence film morphology. By placing a grid between a remote plasma and the substrate, the potential seen by GaN and InN films could be controlled to either allow the growth of metal rich nano pillars using a positive grid potential, or films with RMS roughness of less than 2 nm with the

grid grounded. For these experiments the plasma was remote, so that the grid was not for ion flux control: the interactions seen were due to electrostatic potential, or charge. Using a negative bias on the grid we also found that residual carbon and hydrocarbon species, left over from the decomposition of trimethyl gallium (TMG), could be removed during GaN growth. Impurity determination by SIMS, UV-Vis film transmission measurements, electrical and visual observation of films is provided. The films were grown at approximately 650 degrees C using a nitrogen plasma source and TMG.

sbutcher@meaglow.com