Review of Examiner 1

1. P1 the statement "The current GaN market is estimated to be $200 million, which is expected to reach $500 million by the end of this decade" is not correct. In fact, it is larger as far as all the GAN based products are concerned.

    Ans: Thank You sir for the pointing out the mistake. Now the line is modified as "The market by 2012 was 200 million, and it's growing at a compound annual growth rate of 24.5% from 2016 to 2022. The global power device market is projected to reach USD 2.6 billion by 2022" and incorporated in page no 1 of Chapter one of the modified thesis. (Source: Seimiconductor Today,
    http://www.semiconductortoday.com/news_items/2016/feb/marketandmarkets_230216.shtml)

2. P1 the statement "it is expected that the present silicon based power and optoelectronics industry is going to be replaced by the GAN based semiconductor devices" in not correct. Si devices will retain their roles in some areas where GaN cannot compete.

    Ans: Thank you sir for the suggestion. We have changed the line in page 1 of chapter one in the modified thesis. Line should be like "its superior power handling capability has attracted a great interest in the commercial and defence applications, and it is expected that the present power and optoelectronics industry is going to experience a huge technological advancement".

3. P29 It would be better to be more specific about the physics for the statements: "we can see that the farthest trapped electron has lower recombination rate compared to the nearer one. Electron trapped near to the channel takes longer time to become neutral".

    Ans: Thank you sir for the suggestion. We modified the language as per proposition. Now the line is incorporated as "From the figure, we can see that the farthest trapped electron has lower recombination rate compared to the nearer one. The electron trapped near to the channel takes longer time to become neutral" in the page no 29, section 2.5.2 of chapter 2 in of the modified thesis.

4. P51 the explanation of the figure 3.14, room temperature photoluminessence of the InGaN/GaN/Si heterostructure is not well justified. The heavy signals might be caused by optical interference instead of luminescence of material with different compositions.

    Ans: Thank you sir pointing out the issue. If the optical interferences were the reason for multiple PL peaks, then the same kind of interferences would have been visible in other samples also. Moreover, the higher spread of InGaN peak in HRXRD scan (omega-2theta (002)) for the INGAN/GAN sample indicates that different indium composition has been incorporated in the InGaN layer.

5. P60-P61 no discussion on the RSM data. What is the implication or conclusion one can draw from these data?

    Ans: Thank you sir for pointing out the issue. The conclusions can be drawn as "The reciprocal space mapping (RSM) plots near to (002) planes are shown in Figure 4.5 for both the structures. It gives information about the structural quality (broadening of the contour) and the Al composition of AlGaN. On the other hand, the asymmetric (105) plane scan for both the structures are shown in Figure 4.6, and corresponding RSM plots are shown inFigure 4.7. The (105) scan with coupling coefficient of 1.56 indicates that the AlGaN layer of both the structures is partially relaxed". These lines have been incorporated in page 60, section 4.3 and chapter 4 of the revised thesis.

6. P68. Mechanical deficiency of figure 4.12.

   Ans: I corrected the caption in figure 4.12 of page 68 chapter 4 of the modified thesis.

7. Missing P69-74

   Ans: Sir this may be the case in the hard copy binding which office has sent to you. I checked my soft copy and hard copy both, but do not find any page missing. In the revised thesis I have ensured that all the pages are present in sequentially.

8. P79. Why is the surface state density different for the three structures, which have the same GaN surface layer?

   Ans: Thank you sir for the comment. That may be due to different Fermi level position at the surface with respect to the trap energy levels for different heterostructures. The InGaN based device is found to form lower trap state density compared to AlGaN/GaN based devices because of Fermi energy elevation in the surface. Hence, lesser trapping effect is contributing to the dispersion of AlGaN/InGaN structure. The same reason was included in page 72, section 4.5.3 in the original version of the thesis. A journal paper [10] has been referred to support the comment in the same page, section and chapter.

9. P82. Typo in mixed (b+c)

   Ans: Thank you sir for pointing out the mistake. I corrected that in the page 82 of chapter 5 of modified thesis. The burger vector for combination of both the dislocations represented by (a+c), where a is for edge type and c for screw type dislocation.

10. P110 typo in Ref. [18]

   Ans: The typing mistake is corrected as per your suggestion in page no 110 of the modified thesis.