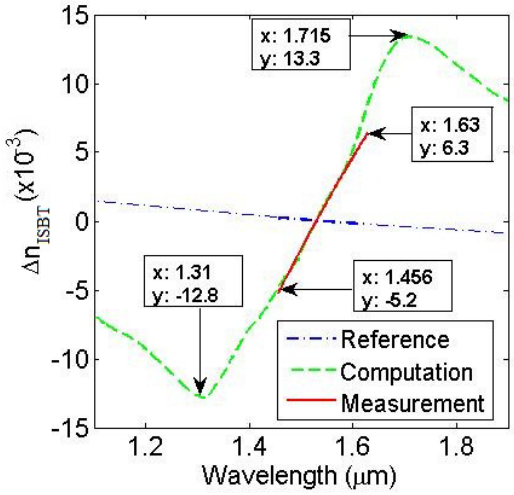

Fig. 6. Measured spectral variation of the contribution of the intersubband transition to the refractive index in the GaN/AlN MQWs interaction layer (solid red line), the corresponding dispersion curve computed via the K-K relations, from the FTIR absorption measurements of Fig. 3 (green dashed line), and the measured dispersion in the reference sample (blue dotted-dashed line) which is an order of magnitude smaller (of the order of 10^{-4}).

4. Summary and conclusions

In this work, we directly measured the contribution of the intersubband transition to the refractive index, arising from a resonance around 1.5 μm wavelength, in a GaN/AlN MQW structure. The experiment was performed using a free-space Mach-Zehnder setup with the MQW sample in a multi-pass waveguide configuration. We have shown that the experimental setup is highly sensitive and can measure dispersion as low as 10^{-4}. The resonant contribution to the refractive index was derived from the interferogram and displayed values between -5×10^{-3} to 6×10^{-3} within the measured spectral range. These values are similar to those in standard *interband-based* modulators in InGaAsP/InP QW. The experimental results coincide with the analysis based on K-K relations for FTIR absorbance measurements. The outcome of this experiment paves the way for realizing ISBT-based integrated Mach-Zehnder phase modulators at the optical communication wavelength range.

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