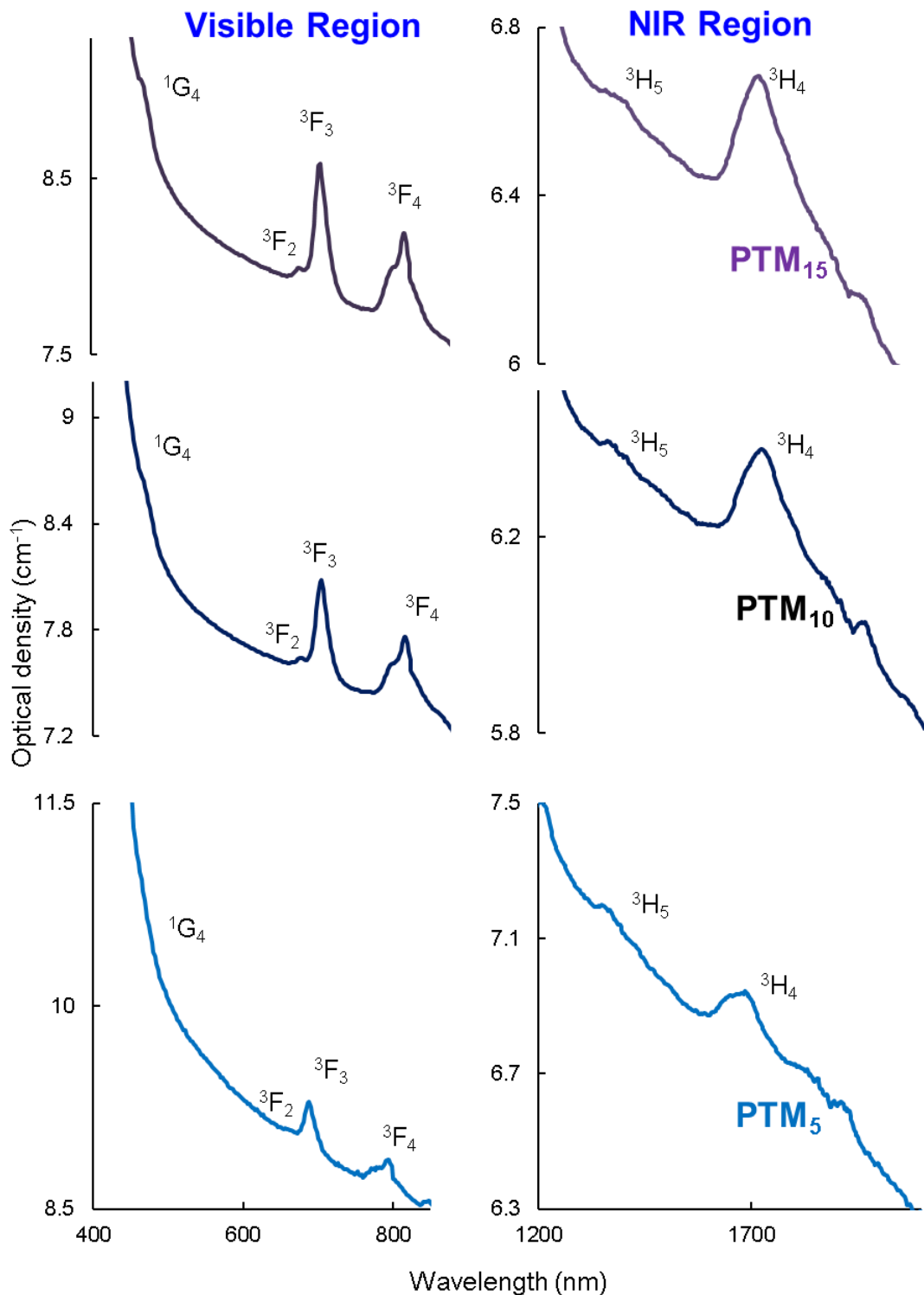






Tm<sup>3+</sup> ion) → <sup>1</sup>G<sub>4</sub>, <sup>3</sup>F<sub>2</sub>, <sup>3</sup>F<sub>3</sub>, <sup>3</sup>F<sub>4</sub>, <sup>3</sup>H<sub>5</sub> and <sup>3</sup>H<sub>4</sub>. Among these, transitions <sup>3</sup>H<sub>6</sub> → <sup>1</sup>G<sub>4</sub> lies in the blue region where as <sup>3</sup>H<sub>6</sub> → <sup>3</sup>F<sub>2</sub>, <sup>3</sup>F<sub>3</sub>, <sup>3</sup>F<sub>4</sub> are lying in orange and red spectral regions. Another two transitions <sup>3</sup>H<sub>6</sub> → <sup>3</sup>H<sub>5</sub>, <sup>3</sup>H<sub>4</sub> are found to be in the infrared region. From the spectra, it is clear that the increasing concentration of thulium ions in the glass matrix does not alter the spectral positions of the absorption bands [3].

Fig. 5 represents the emission spectrum of P<sub>2</sub>O<sub>5</sub>-CaO-Na<sub>2</sub>O-K<sub>2</sub>O: 0.5 Tm<sub>2</sub>O<sub>3</sub> glass excited with 460 nm (<sup>3</sup>H<sub>6</sub> → <sup>1</sup>G<sub>4</sub>) have exhibited <sup>3</sup>H<sub>5</sub> and <sup>3</sup>H<sub>4</sub> transitions. **Figure 3:** Optical absorption spectra of P<sub>2</sub>O<sub>5</sub>-CaO-Na<sub>2</sub>O-K<sub>2</sub>O: 0.5 Tm<sub>2</sub>O<sub>3</sub> glass in the visible and NIR regions. When pumped with 460 nm laser light, the <sup>3</sup>H<sub>6</sub> state is excited. The emission spectra of remaining samples also produce the same with minor intensity changes.



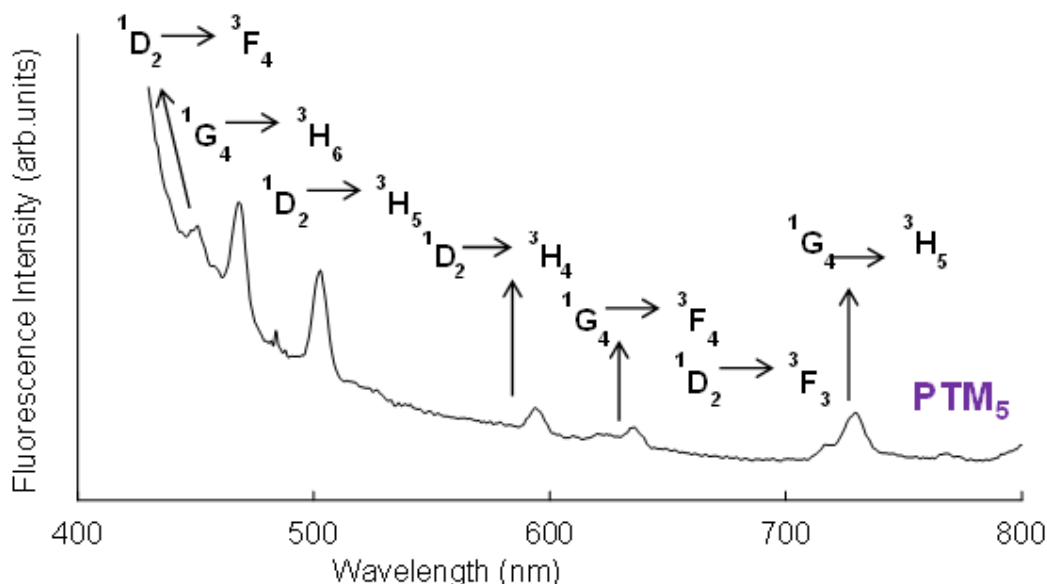


Figure 4: Emission spectra for  $P_2O_5$ -CaO- $Na_2O$ - $K_2O$ :  $0.5Tm_2O_3$  glass ( $\lambda_{exc} = 460$  nm).

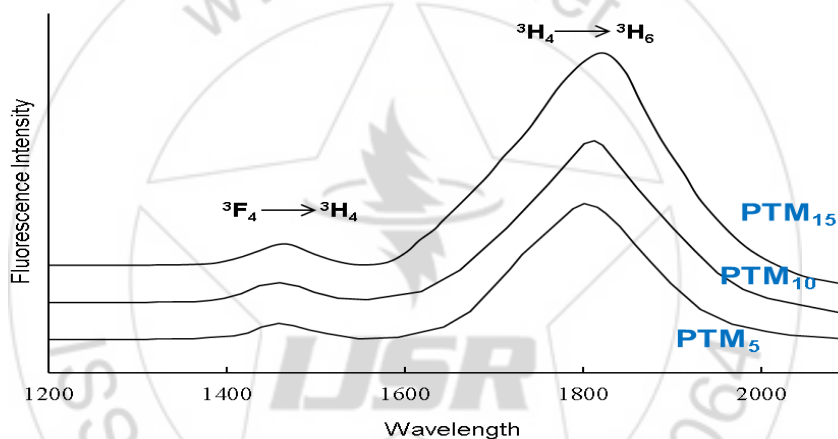


Figure 5: Emission spectra of  $P_2O_5$ -CaO- $Na_2O$ - $K_2O$ :  $Tm_2O_3$  glasses in NIR region ( $\lambda_{exc} = 686$  nm).

#### 4. Conclusion

$P_2O_5$ -CaO- $Na_2O$ - $K_2O$ :  $Tm_2O_3$  glasses have been synthesized by melt quenching and further samples were characterized by XRD, SEM, and spectral Studies viz., optical absorption and fluorescence. XRD and SEM studies indicated that prepared glasses have pure amorphous structure. The optical absorption spectra have exhibited nine (09) absorption bands all from  $^3H_6$ . With increase of  $Tm_2O_3$ , no significant increase/shift in peaks has been observed. Emission spectra also recorded with two excitation wavelengths corresponding to visible and NIR regions. The infrared radiation is found in all samples at about 1800 nm that would be more useful in modern optoelectronic devices.

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