

## Flat Panel Displays and Fluorescence

## Introduction

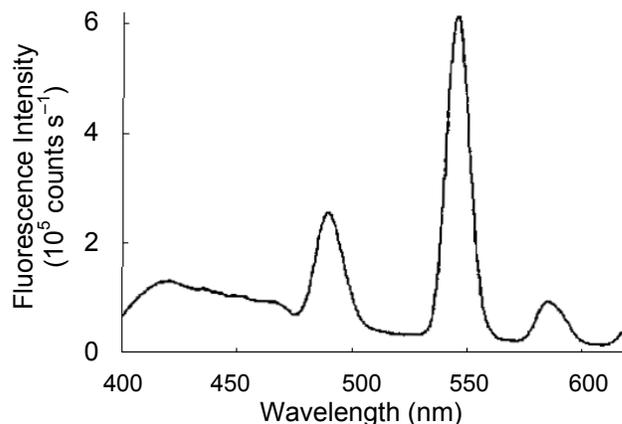
One of the fastest-growing segments of the semiconductor industry is concerned with a new generation of graphic displays for communications and high-definition television sets. For phosphors that might be used as the active medium in such displays, the critical characteristics are the lifetimes and wavelengths of their emissions.

## Experiment and Results

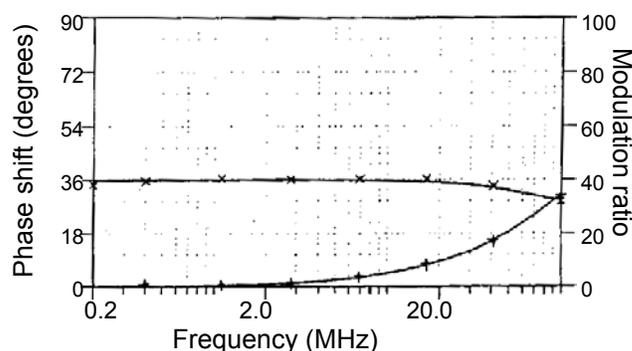
Because the lifetimes and wavelengths of emissions were required, the SPEX® FLUOROLOG- $\tau$ ® steady-state and lifetime spectrofluorometer was chosen for this investigation. To further complicate matters, the lifetime of the phosphor had to be obtained in a short period (three to five minutes) because of the rapidly changing character of the material. In addition, the phosphor and matrix were highly scattering, so stray-light rejection was crucial.

Figure 1 shows the emission spectrum of the final phosphor, confirming a useful visible emission dominated by the 550-nm peak.

In Figure 2 the results of the quick lifetime study (eight frequencies scanned in five minutes) indicate a three-component system, dominated by a very fast ( $10^{-9}$  s) decay. This fast emission assures that the phosphor will produce a high quantum yield within a timeframe compatible with refreshing the CRT's screen.



**Figure 1.** Fluorescence emission spectrum of the phosphor complex, showing luminescence in the visible range.



**Figure 2.** Phase-shift (+) and modulation-ratio frequency response (x) of phosphor complex.

## Conclusion

This particular investigation of phosphor emission characteristics was made possible by the excellent stray-light reflection, sensitivity, and wide lifetime range of the FLUOROLOG- $\tau$ ® producing rapid and accurate characterization of the phosphor.

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