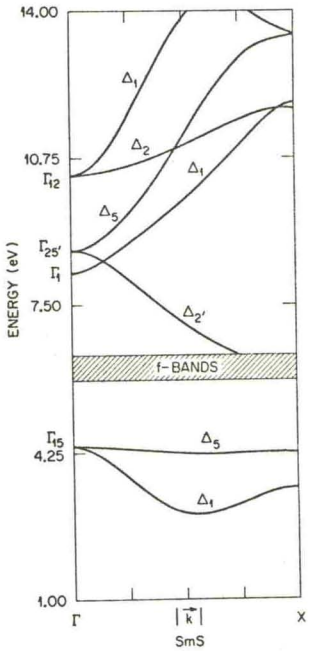

Figure 6. Results for SmS using α = 0.781 and a lattice parameter of 11.06 a.u. All energies relative to V_o value of -1.222 ry.

LUMINESCENT PROPERTIES OF RARE EARTH OXYSULFIDE FILMS*

R. V. Alves, T. G. Maple, L. E. Sobon, and R. A. Buchanan

Lockheed Missiles & Space Company

Palo Alto, California 94304

ABSTRACT

We have made LOS films of intrinsic efficiency equivalent to that of LOS powders for several activators. Because of light trapping only one ninth of the film light is directly observable. However, the films have such superior thermal conductivity compared to the powders that they sustained an excitation power density greater than 6W/mm^2 without damage. At this excitation level, the films were brighter than the saturated brightness of the corresponding powder screen. We have made multilayer films simply by depositing LOS with one activator over LOS with a different activator. The multilayer films possessed efficient luminescence whose color was voltage dependent.

Introduction

The rare earth oxysulfides, RE_2O_2S (REOS) are an isomorphic family of materials which are among the most efficient cathodoluminescent phosphors known. We felt that such materials were natural candidates for thin film luminescent devices if efficient films could be made from them. Light trapping reduces the overall efficiency of films, but their higher thermal conductivity relative to powders offers the possibility of increased excitation without thermal saturation or high temperature damage. Thus, it may be possible to achieve a higher brightness in REOS films than in the corresponding powders. Finally, the multiactivator host capabilities of REOS's suggested simple, physically and chemically compatible film layers for a voltage-selectable multicolor, multilayer cathodoluminescent screen.

Goldberg [1] has published a comprehensive review of luminescent thin film technology and properties. We recommend it to the reader as an index to luminescent film work up to 1965.

*This research was supported by the Advanced Research Projects Agency of the Department of Defense under Contract No. DAHC 15-71-C-0138