CHAPTER I

INTRODUCTION [1,2,3]

Luminescence was initially studied in natural minerals. If ultraviolet radiation of the correct wavelength is allowed to fall upon willemite (a natural mineral of zinc silicate containing traces of manganese), a green light is emitted. Materials which convert energy into visible radiation by such processes are called phosphors or liminophors. The material is called phosphorescent if the emission continues after the removal of the energizing radiation. In some materials the emission of radiation only occurs whilst the phosphor is being excited by an external source of energy, these materials are said to be fluorescent. The nature of the exciting energy is indicated by means of a prefix, thus electroluminescence is the emission of light from the application of an electric field to a crystalline phosphor, which is placed as a thin layer between two closely spaced electrodes. One of the electrodes must be transparent. The light output varies with voltage and occurs as light pulses more or less in phase with voltage pulse. They are thus operated on A.C. with light output strongly dependent on power frequency.

The most important material today in electroluminescence is ZnS:Cu, discovered by Destriau in 1936, the phenomenon has been observed in a large number of materials as shown in the list of Table 1.1. The efficiency of light production in most cases, however is very low compared to that of ZnS; figures of 10^{-6}% are sometimes

observed. The low output in many cases may take detection of electroluminescence difficult. If dielectric breakdown occurs the resultant visible emission or photoluminescence of the material excited by ultraviolet radiation generated in the breakdown may confuse the observation.

Table 1-1 Materials in which Electroluminescence has been Observed.[3]

Material	Material
Group II-IV Compounds	Other materials
ZnS	Ge
CdS	Si
ZnSe	C(diamond)
CdTe	SiC
ZnO	NaCl
BeO	AgCl
MgO	ZnF_2
CaS	CaF_2
SrS	Al_2O_3
BaS	Cu_2O
Group III - V Compounds	SnO_2
GaP	TiO_2
GaN	$BaTiO_3$
GaSb	$SrTiO_3$, $CaTiO_3$
GaAs	$KNbO_3$, $PbZrO_3$
InP	$CaWO_4$
InSb	Zn_2SiO_4
BN	Ice
AlN	Organic Materials
AlP	