Letters to the Editor

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Electroluminescence from Boron Nitride

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ELECTROLUMINESCENT materials heretofore investigated have consisted mainly of sulfur-dominated host crystals, with copper activator.[1] It has now been found that boron nitride can be excited by an alternating electric field. The emission is complex, existing mainly in the ultraviolet, but extending into the red region of the spectrum. Figure 1 is a spectral distribution curve of the electroluminescence emission from boron nitride.[2]

The spectrum was obtained from a cell consisting of a transparent quartz substrate, one side of which had a transparent conducting coating, on which the boron nitride powder was deposited in a castor oil slurry.

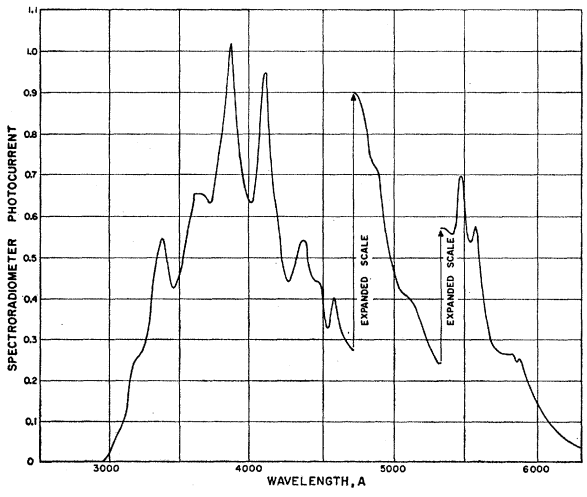

FIG. 1. Spectral distribution curve (uncorrected[3]) of the field-excited emission from boron nitride. The voltage applied to the cell was 400 v rms, at 20 Kc.

The phosphor slurry was separated from the outer electrode by a mica sheet. Sinusoidal excitation was used, and the spectral distribution curve was obtained with an automatic recording spectroradiometer.[3]

Some of the photoluminescence and cathodoluminescence characteristics of boron nitride, in the visible region, have been described by Tiede,[4] who reported a complex emission spectrum attributed to carbon as an activator.

The present results with boron nitride powder are found with alternating field excitation, and with an electrode which is isolated from the phosphor. This differs from the electroluminescence of silicon carbide, discussed by Lossev[5] and by Lehovec,[6] and from the electroluminescence found by Smith[7] in cadmium sulfide.

Further details and discussion of the luminescence from boron nitride will be presented in a forthcoming article.

[1] See, for example, J. F. Waymouth and F. Bitter, Phys. Rev. **95**, 941 (1954). Bernanose has reported electroluminescence from organic materials, Brit. J. Appl. Phys., Suppl. No. 4, 54 (1955).
[2] Purified boron nitride was obtained from the Norton Company and from the Carborundum Company.
[3] The spectral distribution is uncorrected for the photomultiplier (1*P*28) response. Measurements with other luminescent sources indicate definitely that the structure reported is due to emission from BN, and is not a characteristic of the instrument.
[4] E. Tiede and F. Buescher, Ber. deut. chem. Ges. **53B**, 2206 (1920); E. Tiede and H. Tomaschek, Z. anorg. u allgem. Chem. **147**, 111 (1925).
[5] O. V. Lossev, Phil. Mag. **6**, 1024 (1928).
[6] Lehovec, Accardo, and Jamgochian, Phys. Rev. **82**, 330 (1951); **83**, 603 (1951).
[7] R. W. Smith, Phys. Rev. **93**, 347 (1954).

Flow of Liquid Helium through Porous Vycor Glass*

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WE have made a preliminary investigation of the superfluid flow of liquid helium through porous Vycor[1] glass tubes with pore diameters in the neighborhood of 5×10^{-7} cm. The outstanding feature of the results is that the onset temperature for superfluid flow is markedly less than the λ point of the bulk liquid.

The porous Vycor was in the form of long tubes open at the top and sealed at the bottom. The inside diameter was about 7 mm and the total length was about 30 cm, but the porous region was confined to a length of about 12 cm at the lower end. The porous region was always totally immersed in the liquid helium bath and the experiment consisted simply of raising or lowering the tube and observing with a cathetometer the rate at which the inner level moved. Above the onset temperature the rate of flow was imperceptible and was over-shadowed by the slow fall of the level due to evaporation. Only slightly below the onset temperature, however, the superfluidity was strikingly obvious, the