

Automated Research of the Thin Film Electroluminescent Indicating Devices

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One of the most promising indicators is the thin film electroluminescent (TFEL) display device. Its main feature is the high design and technological parameters [1], which leads to their use in the military, medical, aerospace engineering, where there are specific requirements for the equipment.

Typical TFEL device structure consists of five layers based on the glass substrate [1]. The central layer is the thin film phosphor which emits light when a large enough electric field is applied across it. Current limiting layers (the insulators) are needed on the either side of the phosphor layer to form a reliable device structure. Finally, electrodes on the top and the bottom of the device complete a basic capacitive structure.

Analysis of the TFEL indicator element characteristics means to obtain information about the nature of the operation and the values of output parameters (threshold voltage, maximum working voltage, dissipated power, brightness, light output ratio) for a chosen structure of the object. Also it means to calculate parameters of the TFEL indicator elements, which are the parameters of materials and layer thicknesses.

Basing on the description of the mathematical apparatus of lighting and electrical characteristics, the parameter calculating sequence has been developed for the TFEL display: the calculation of the threshold voltage; the calculation of the maximum operating voltage; the calculation of the dielectric phosphor capacitances; the calculation of the average power dissipation; the calculation of the average brightness; the calculation of the light output.

Next step in calculation is the determination of the relative error of measuring the brightness at a given operating voltage. During the measurements it is possible to determine the graph of the dependence between brightness and voltage. This is necessary in controlling the halftone pixels with pulse amplitude modulation.

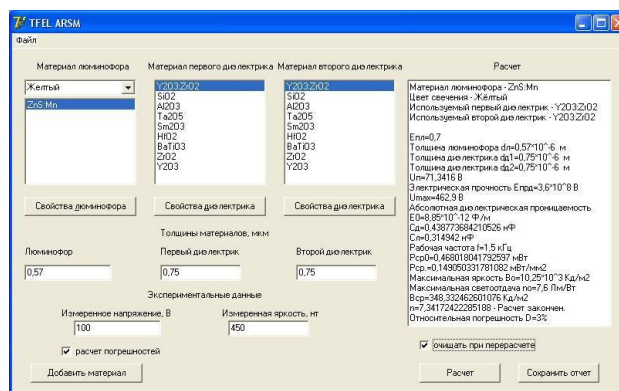


Fig. 1. TFEL ARSM program interface

The automated system of scientific research TFEL ARSM (Fig. 2) is a software application that runs from the Windows operating system. The program works directly with the user and establishes the necessary links for the calculation. The developed system is a software module that analyzes, systematizes and stores data of the investigated TFEL indicator device.

References

1. D. Evsevichev, O. Maksimova, M. Samokhvalov, *The CAD System of the Thin Film Electroluminescent Display*, in: The 11th International Meeting on Information Display (IMID 2011), KINTEX, Seoul, Korea, 2011, pp. 768-769.