

INFLUENCE OF MATRIX MATERIAL
ON THE MECHANISM OF EMISSION
FROM Sc–Ba IMPREGNATED
THERMIONIC EMITTERS

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S u m m a r y

A comprehensive analysis of the influence of rhenium and scandium oxide on the mechanism of emission from impregnated tungsten thermionic emitters has been carried out. The emission abilities of scandium-barium, rhenium-tungsten, and purely tungsten emitters and their dependences on the electric field strength are demonstrated to be independent of the cathode matrix material but related to the presence of scandium oxide in their emission-active substance. However, the processes of emitting surface formation turned out substantially different for emitters with different matrix materials. In the case of tungsten matrix, scandium oxide gives rise to an increase of the number of crystallites and a variation of their shape on the emitting surface of the emitter, which creates favorable conditions for thermo-field emission. If a rhenium-tungsten matrix is applied, the presence of scandium oxide not only increases the dimensions of crystallites of active substance, but stimulates the composition variations in the emitting layer of the emitter, which is also accompanied by the thermo-field effect.