

Abstract Submitted
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A study on a new material to replace the thoriated-tungsten electrode TADAO UETSUKI, Tsuyama National College of Technology, AKIRA MATSUO, Nippon Tungsten Co., Ltd., KATSUYUKI MORII, HISAO HATANAKA, Himeji Rika Co., Ltd. — ThO₂-W is popularly used for the electrodes of a super-high pressure mercury lamp used in semi-conductor processing. This is because the work function of ThO₂-W is much lower than that of the tungsten, therefore its electron emission performance is excellent compared with tungsten. However, ThO₂-W is not desirable for the global environment because of its radioactivity. Therefore it would be very useful to make a new non-radioactive material to replace ThO₂-W as the electrode, and many research efforts have been attempted for this purpose. However, the materials which were researched till now could not improve upon ThO₂-W lifetime when they were used as the electrode in the lamp. This means these materials have higher work function than ThO₂-W. The higher work function causes higher electrode temperatures, leading to faster evaporation of the electrode material and shorter lamp life. The purpose of our research is to make a new electrode material having better performance than ThO₂-W. We have studied which oxide is best by controlling the particle radius or the volume of metal oxides mixed into the tungsten. In this paper we report the results obtained by studying Nd₂O₃-W and Sm₂O₃-W as the electrodes of a super-high pressure mercury lamp used for the semi-conductor processing.

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