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# Superconducting Nb/Pb electron photocathode - towards improved adhesion of lead layer to niobium substrate

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The preparation of a superconducting photocathode for a sc electron gun, composed of a photoemission lead layer deposited on niobium substrate must fulfil strict requirements not only in terms of photoemission efficiency, operation in ultra high vacuum and high-power electromagnetic field. Of fundamental importance is the practical requirement for strong adhesion of the Pb layer. It yields from a procedure of cleaning the e-gun in a stream of ultrapure water under 100 bar. Achieving good adhesion in this case is a difficult condition to meet because Nb and Pb neither form solid solutions nor even present good mutual miscibility or wettability. A new approach is presented to improve Nb-Pb adhesion by pre-implanting lead into niobium before final deposition of the photoemissive Pb layer. The performed studies indicate the effectiveness of this method in the case of Pb layers deposited by magnetron sputtering and its failure for Pb applied by using cathodic arcs. These results are discussed in the light of nanoindentation studies and universal models describing the state of intrinsic stress in the transition zone between a substrate and deposited layer.

## Footnotes

## Funding Agency

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