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Quasi-continuous electron generation in a pyroelectric accelerator driven by periodically varying temperature

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Development of compact pocket-style electron accelerators meeting safety regulations is a complementary task requiring stable, reliable, and reproducible particle sources with controllable parameters. We employed a new approach for pyroelectric accelerator operation - periodically varying temperature of lithium tantalate (LiTaO3) crystal. It enables to generate stable quasi-continuous electron beam with energy about few tens of keV. We managed to observe and characterize the avalanche process at pyroelectric effect in surrounding vacuum conditions. This phenomenon is responsible for multiplication of electrons between pyroelectric crystal and metallic target. We have demonstrated the great potential of this compact electron source by performing reliable energy-dispersive spectroscopy for element analysis of solid samples.

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