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## **Preparation and Characterization of Large Scale a-Se Stabilized Alloys for Detection and Digital Imaging Applications**

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### **Abstract:**

We are reporting on the large scale zone refining (ZR) of precursor selenium materials and the synthesis of amorphous selenium (a-Se) bulk alloys for detection and digital imaging applications. The bulk a-Se stabilized alloys have been successfully utilized to fabricate large area multilayered thin film structures on various read-out substrates including CMOS. The grown a-Se bulk alloys and in thin films have shown high promise for these applications due to high dark resistivity ( $1-6 \times 10^{14} \Omega \cdot \text{cm}$ ), good charge transport properties ( $\mu\tau_e = 2-5 \times 10^{-6} \text{cm}^2/\text{V}$ ), high photoconductivity, low cost, and relative easiness for scaling up. Various a-Se stabilized alloys have been synthesized in controlled argon ambient and used for fabricating large area devices with an overall area up to 4x4 sq. inch. The synthesized alloys and thermally evaporated films have been thoroughly characterized by X-ray diffraction (XRD), glow discharge mass spectroscopy (GDMS), differential scanning calorimetry (DSC), Raman spectroscopy and X-ray photoelectron spectroscopy (XPS). The detectors fabricated from these alloys have demonstrated high promise for high energy sensors and digital imaging applications. Details of various steps involved in detector fabrication and testing of these devices will also be presented