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(54) **DOMAIN ENGINEERED FERROELECTRIC OPTICAL RADIATION DETECTOR HAVING MULTIPLE DOMAIN REGIONS FOR ACOUSTIC DAMPENING**

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(51) **Int. Cl.**[7] **G01J 5/00**
(52) **U.S. Cl.** **250/338.3**
(58) **Field of Search** 250/338.3

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(57) **ABSTRACT**

A pyroelectric detector with significantly reduced microphonic noise sensitivity that includes a pyroelectric detector element constructed from a z-cut $LiNbO_3$ or $LiTaO_3$ electret. Selective domain reversal is accomplished in the electret by applying an electric field. Electrodes are attached to either surface of the electret spanning the domain reversed region and a portion of the original domain region to create areas of equal and opposite sensitivity. The detector is mounted in an electrically grounded container or housing. The detector may also be constructed having multiple detector regions to accommodate resonant acoustic frequencies of the electret, to function as a position sensor, or both. In other words, the position sensor has multiple domain regions that also accommodate acoustic frequencies. The detector may also be constructed having domain reversed regions placed on the electret in a periodic pattern having a geometry and spacing that is related to the acoustic impulse response of the electret. Needle domains may also be interspersed in portions or throughout the electret to scatter acoustic waves and thereby reduce acoustic noise. Multiple detectors can be produced in a simple and inexpensive manner using shadow masking techniques.

25 Claims, 22 Drawing Sheets