



Development for Germanium Blocked Impurity Band Far-Infrared Image Sensors with Fully-Depleted Silicon-On-Insulator CMOS Readout Integrated Circuit

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We are developing far-infrared (FIR) imaging sensors for low-background and high-sensitivity applications such as infrared astronomy. We employ germanium blocked impurity band (Ge BIB) detectors and fully-depleted silicon-on-insulator (FD-SOI) CMOS readout integrated circuit (ROIC) with pixel-to-pixel interconnection.

We have successfully demonstrated the Ge BIB detectors fabricated by surface activated bond (SAB) technology whose cut-off wavelength is longer than 160 micron without any stressing mechanism. Transparent electrical contact fabricated by molecular beam epitaxy (MBE) shows excellent performance.

We have also demonstrated CMOS op-amp with FD-SOI technique which works at 4K with 1 micro watt operating power. Other elements which are necessary to configure the ROIC, such as digital logic and analog switch, have also been developed.

We propose a new concept, Si supported Ge detector, in order to overcome the mismatch in thermal expansion between Ge detector and Si ROIC. A demonstration device, which consists of the Si supported Ge detector and the ROIC, is hybridized by Micro-Cone-Shaped Au-Bump.

We will present the current status of our development for the FIR imaging sensor.