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Title: a-SiH p-i-n structures with extreme i-layer thickness

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Abstract: We present measurements and numerical simulation of a-Si:H p-i-n detectors with a wide range of intrinsic layer thickness between 2 and 10 pm. Such a large active layer thickness is required in applications like elementary particle detectors or X-ray detectors. For large thickness and depending on the applied bias, we observe a sharp peak in the spectral response in the red region near 700 nm. Simulation results obtained with the program ASCA are in agreement with the measurement and permit the explanation of the experimental data. In thick samples holes recombine or are trapped before reaching the contacts, and the conduction mechanism is fully electron dominated. As a consequence, the peak position in the spectral response is located near the optical band gap of the a-Si:H i-layer. (C) 2009 Elsevier B.V. All rights reserved.

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