

**Title:** Image and color recognition using amorphous silicon p-i-n photodiodes

**Author(s):** Louro, P (Louro, P); Vieira, M (Vieira, M); Fantoni, A (Fantoni, A); Fernandes, M (Fernandes, M); de Carvalho, CN (de Carvalho, CN); Lavareda, G (Lavareda, G)

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**Abstract:** Large area hydrogenated amorphous silicon single and stacked p-i-n structures with low conductivity doped layers are proposed as monochrome and color image sensors. The layers of the structures are based on amorphous silicon alloys (a-Si(x)C(1-x):H). The current-voltage characteristics and the spectral sensitivity under different bias conditions are analyzed. The output characteristics are evaluated under different read-out voltages and scanner wavelengths. To extract information on image shape, intensity and color, a modulated light beam scans the sensor active area at three appropriate bias voltages and the photoresponse in each scanning position ("sub-pixel") is recorded. The investigation of the sensor output under different scanner wavelengths and varying electrical bias reveals that the response can be tuned, thus enabling color separation. The operation of the sensor is exemplified and supported by a numerical simulation. (C) 2005 Elsevier B.V. All rights reserved.

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**Reprint Address:** Louro, P (reprint author), ISEL, DEETC, R Conselheiro Emídio Navarro 1, P-1900014 Lisbon, Portugal

**E-mail Address:** plouro@deetc.isel.pt

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