

*Abstract*

# A Low-Cost Visible Light Communications System Based on Organic Photodetection for Transmitting Images <sup>†</sup>

Pablo Corral González \*, Fernando Rodríguez-Mas, José Luis Alonso, Juan Carlos Ferrer and Susana Fernández de Ávila

Communications Engineering Department, Universidad Miguel Hernández, Av. Universidad, s/n, Ed. Innova, 03202 Elche, Spain

\* Correspondence: pcorral@umh.es

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**Abstract:** In Visible Light Communication (VLC) Systems, data are transmitted by modulating light from an illumination source, that could be an ordinary lamp or light-emitting diodes (LEDs). Photovoltaic cells based on massive heterojunctions of semiconductor polymers have focused the attention of researchers due to several potential advantages over their inorganic counterparts, such as simplicity, low cost and the ability to process large area devices even on flexible substrates. In this paper, we use commercial LEDs in transmission and organic photodetectors (OPD) based on poly(3-hexylthiophene) (P3HT) and a phenyl-C61-butyric acid methyl ester (PCBM) blend used as active layer in reception. We have fabricated and characterized the I-V curve and the Bit Error Rate (BER) response of the OPD using low cost processing techniques and we have used an Atmel 8-bit microcontroller in order to control the electronics to transmit and modulate the signal. Finally, in this work, we have developed and characterized organic photodetectors in a low cost visible light communications system capable of transmitting an image file in real-time, as a proof of concept that is cost effective, since the whole system was implemented using low cost components.

**Keywords:** visible light communications; organic photodetector; P3HT:PCBM; IEEE 802.15.7.