

1 [Article

2 **A Low-cost Visible Light Communications System**
3 **Based on Organic Photodetection For Transmitting**
4 **Images**

5 **Corral, P.^{1*}, Rodríguez-Mas, F.¹, Alonso, J. L.¹, Ferrer, J. C.¹ and Fernández de Ávila, S.¹**

6 ¹ Universidad Miguel Hernández, Communications Engineering Department, Av. Universidad, s/n, Ed.
7 Innova, 03202, Elche, Spain.

8 * Correspondence: pcorral@umh.es;

9 Received: date; Accepted: date; Published: date

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

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