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Optoelectronic flexible devices based on WS_2 exfoliated by lithium intercalation

Alternative sources of energy have become crucial in the current environmental crisis. For example, converting strain, a temperature difference, or light into electrical current in materials supported on flexible substrates manages to reduce CO_2 emissions compared to traditional optoelectronic materials [1-3]. Moreover, when those materials, that exhibit optoelectronic characteristics, are low dimensional, the response increases considerably in contrast with their bulk counterpart [2]. For example, when transition metal dichalcogenides (TMDs) are exfoliated to obtain monolayers, their bandgap changes from an indirect transition to a direct one, thus enhancing the photocurrent [4]. The purpose of our study is to develop and measure optoelectronic flexible devices based on tungsten disulfide (WS_2). This is done by exfoliating WS_2 via lithium intercalation and then printing WS_2 on paper. The fabrication of optoelectronic devices was achieved, managing to reach sensibilities of over 10% of dark conductivity and responsivities over $20\mu AW^{-1}$. This research will lead to the production of efficient optoelectronic flexible devices based on TMDs.

References

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Figures

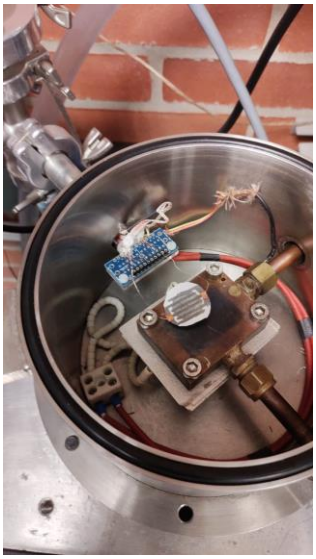

Figure 1: Photocurrent measurement set-up and WS_2 based device printed on paper.