National Graphene Institute
Booth St E, Manchester M13 9PL, UK

The University of Manchester
School of Physics & Astronomy
Oxford Road, Manchester, M13 9PL

Professor Vladimir FALKO

Director of National Graphene Institute
vladimir.falko@manchester.ac.uk

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Reviewer report: PhD thesis "Optical properties of thin layers of transition metal dichalcogenides", presented by Maciej Koperski in view of his application for the PhD degree at the University of Warsaw.

The Thesis clearly demonstrates the original contribution of the Candidate to the field of optics of two-dimensional materials, including:

- the first observation of Zeeman splitting and identification of g-factors for excitons in atomically thin layers of transition metal dichalcogenides (TMD).
- the first observation of single-photon emission due to localized excitons in thin layers of TMDs.

These results are fundamental for the field of optics of TMDs; they are already gathering a large number of citations.

The Candidate has demonstrated his/her experimental skills. The description of optical experiments and their interpretation are sound. Relation between absorption and emission spectra are clearly explained, and the attribution of lines to processes is argued very convincingly. Discussion of dark and bright excitons in WSe_2, in Chapter 2, and analysis of Zeeman splitting in TMDs offer a complete picture of optically active interband transitions in these 2D materials. Chapter 3 describes a spectacular observation of single-photon emission by localized excitons in TMDs.

Overall, this Thesis is written clearly, with excellent quality of figures (both representing data and sketches). Style of the presentation is perfectly suitable for a PhD Thesis. State of the art is described well; the background information on optical properties of TMDs is quite complete and provided suitable references.

In summary, the PhD manuscript of Maciej Koperski reports the excellent research work and truly valuable results. In my opinion, the presented Thesis fully qualifies the candidate for a public defense of the PhD thesis, and, consequently, for a degree of Doctor in physics.

Prof V Falko, Director of NGI

Digitally signed by Prof V Falko, Director of NGI
DN: cn=Prof V Falko, Director of NGI, o=University of Manchester, ou=National Graphene Institute, email=vladimir.falko@manchester.ac.uk, c=GB
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