

Magneto-optical spectroscopy of gated few layer CrSBr

A. Rupp¹, F. Tabataba-Vakili^{1,2,7}, H. P. G. Nguyen¹, K. Mosina³, A. Papavasileiou³, K. Watanabe⁴, T. Taniguchi⁵, P. Maletinsky⁶, Z. Sofer³, A. S. Baimuratov¹, and A. Högele^{1,2}

¹ Department of Physics, Munich Quantum Center, and Center for NanoScience (CeNS), Ludwig-Maximilians-Universität München, München, Germany

² Munich Center for Quantum Science and Technology (MCQST), München, Germany

³ Department of Inorganic Chemistry, University of Chemistry and Technology Prague, Prague, Czech Republic

⁴ Research Center for Functional Materials, National Institute for Materials Science, Tsukuba, Japan

⁵ International Center for Materials Nanoarchitectonics, National Institute for Materials Science, Tsukuba, Japan

⁶ Department of Physics, University of Basel, Basel, Switzerland

⁷ Department of Physics, Technical University of Braunschweig, 38106 Braunschweig, Germany

The initial discovery of atomically thin van der Waals (vdW) magnets has attracted considerable interest as key components for the realization of spintronics [1]. Among these materials, the vdW magnet CrSBr stands out for its remarkable air-stability and high Néel temperature, maintaining its magnetic order down to the ferromagnetic monolayer and antiferromagnetic bilayer. In addition, the unique combination of magnetic and semiconducting properties enables an optical investigation with excitons, which are coupled to their interlayer magnetic order [2,3].

In this study, we conducted reflectance as well as photoluminescence spectroscopy on hBN-encapsulated mono-, bi-, and trilayer CrSBr under the influence of electrostatic doping and external magnetic fields [4]. Our measurements revealed a range of doping-dependent optical features, including charged exciton complexes emerging in bi- and trilayer. Upon magnetic field, we observed a parabolic dispersion along the c- and a-axes, contrasted by spin-flip transitions with hysteresis along the b-axis.

These findings position CrSBr as a promising candidate for further investigation on 2D magnetism, as well as for potential applications in novel nanomagnetic devices.

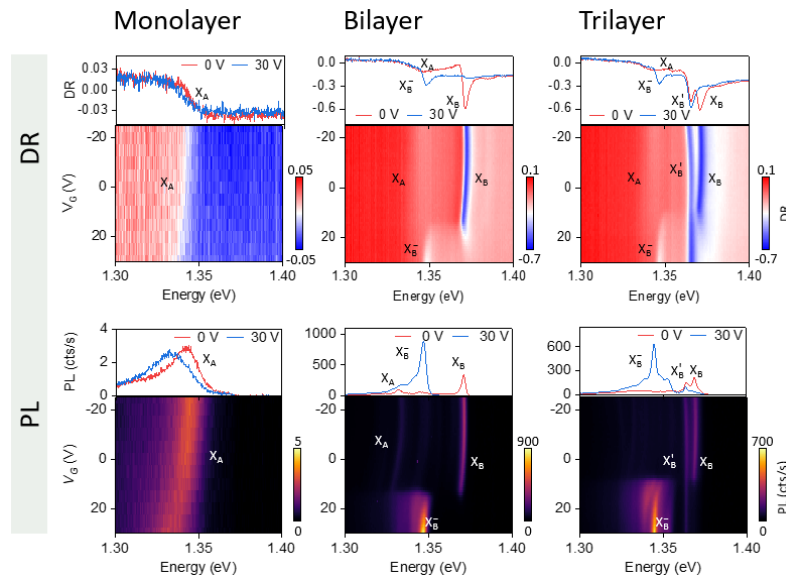


Figure 1: Mono-, Bi- and Trilayer CrSBr in cryogenic spectroscopy and under doping.

References

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*Email: anna.rupp@physik.uni-muenchen.de