Coffee Lectures

What the hell is a postprint?

Green OA Publishing in a nutshell

Dr. Rainer Rees

09 September 2020, Webinar via Zoom

Goals:

- Meaning of the different denominations like pre- and postprint, accepted author manuscript and more

- Differences of these versions with regards to Open Access

Accepted Manuscript/ Postprint:
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- Institutional (Research Collection)
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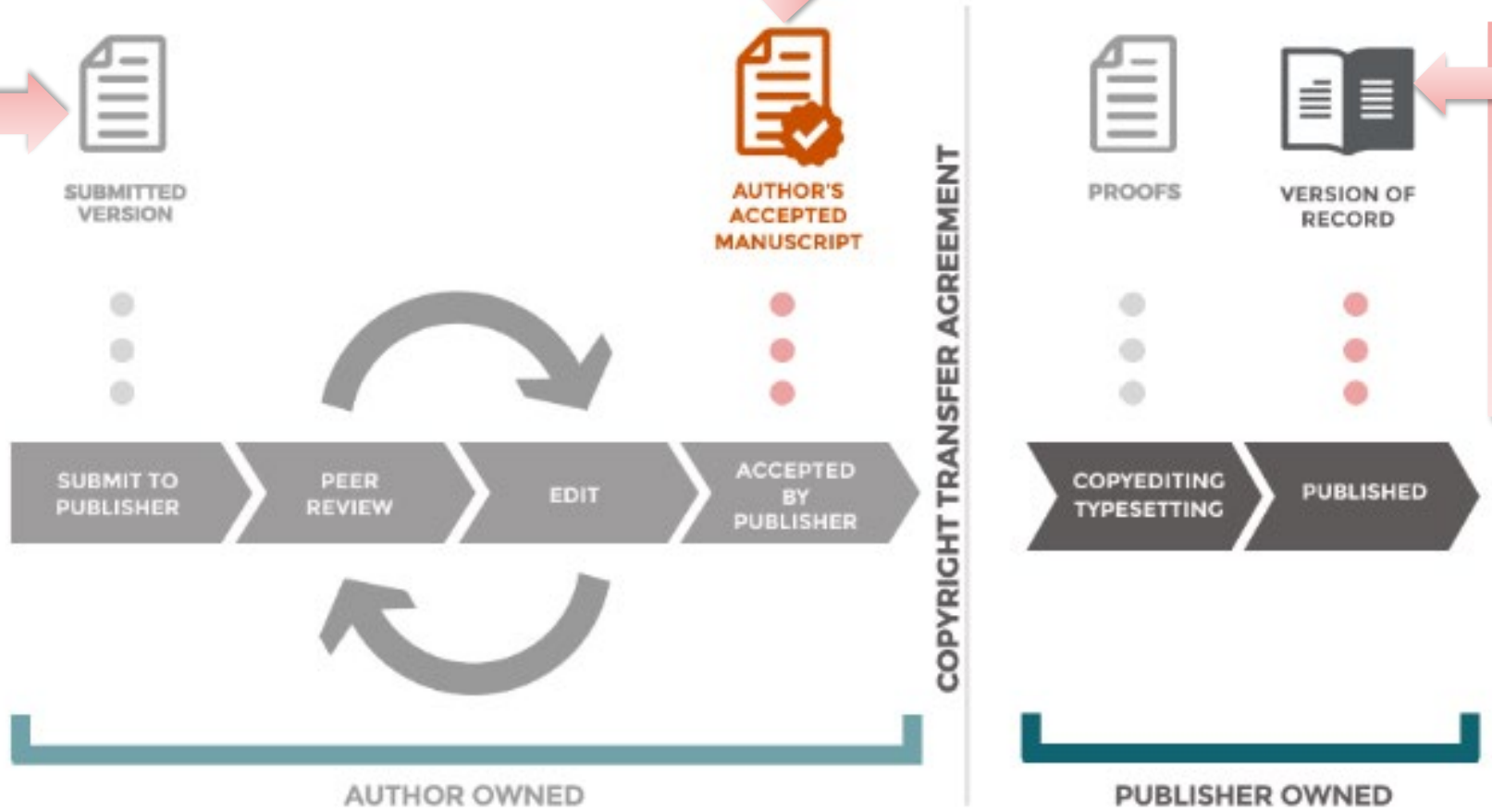

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Observation of Magnetic Proximity Effect Using Resonant Optical Spectroscopy of an Electrically Tunable $MoSe_2/CrBr_3$ Heterostructure

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(Dated: February 7, 2020)

Van der Waals heterostructures combining two-dimensional magnetic and semiconducting layers constitute a promising platform for interfacing magnetism, electronics, and optics. Here, we use resonant optical reflection spectroscopy to the observe magnetic proximity effect in a gate-tunable $MoSe_2/CrBr_3$ heterostructure. High quality of the interface leads to a giant zero-field splitting of the K and K' valley excitons in $MoSe_2$, equivalent to an external magnetic field of 12 T, with a weak but distinct electric field dependence that hints at potential for electrical control of magnetization. The magnetic proximity effect allows us to use resonant optical spectroscopy to fully characterize the $CrBr_3$ magnet, determining the easy-axis coercive field, the magnetic anisotropy energy, and critical exponents associated with spin susceptibility and magnetization.

Two-dimensional (2D) magnetic materials have attracted considerable attention due to their potential applications in spintronic devices [1, 2]. Since the first demonstration that magnetism persists down to the monolayer limit in chromium trihalides (CrX_3, X = Cl, Br, I)[3, 4], much progress has been made, both in understanding fundamental properties of these materials [5–13] and investigation of crucial steps towards applications [14–22]. Concurrently, transition metal dichalcogenides (TMDs) have established themselves as 2D semiconductors with remarkable optical properties [23–25] and possible applications in photonics and valleytronics [26–28]. Van der Waals heterostructures composed of different 2D materials have the potential to realize atomically smooth interfaces that are not affected by lattice structure mismatch between the layers, allowing in principle arbitrary combinations of materials [29]. Magnetic proximity effect in such structures on the one hand leads to transfer of magnetization to otherwise non-magnetic layers, and on the other hand may allow for controlling magnetization using electrical or optical excitation.

In this Letter, we use resonant optical spectroscopy to unequivocally demonstrate the magnetic proximity effect in a $MoSe_2/CrBr_3$ heterostructure, where we observe a large zero-field splitting of the K and K' exciton resonances in $MoSe_2$. We find that the magnetization of $MoSe_2$ is exclusively induced by exchange coupling of conduction band electrons. We use the shift of $MoSe_2$ excitonic resonances to study the magnetic properties of $CrBr_3$, and determine the magnetic anisotropy as well as the critical exponents associated with magne-

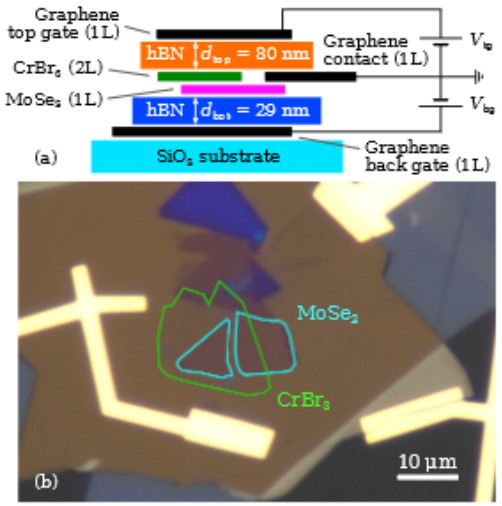

FIG. 1. (a) Schematic of the layer structure of the device and electrical connectivity. A bilayer $CrBr_3$ and monolayer $MoSe_2$ are encapsulated in hBN. Monolayer graphene flakes are used as top and bottom gates and as contact to $MoSe_2$. The stack is placed on a transparent SiO_2 substrate. (b) Optical micrograph of the device, with $MoSe_2$ and $CrBr_3$ outlined in blue and green, respectively.

hexagonal boron nitride (hBN) on a SiO_2 substrate, as shown schematically in Fig. 1(a). Monolayer graphene

https://doi.org/10.3929/ethz-b-000397384

Accepted Version/Postprint:

- Simple or no layout
- Statement
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Why this version?

+ Peer-reviewed
+ Fulfills funder requirements for EU and SNSF projects

Where to get it:

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Title: **Transition metal-mediated metathesis between P–C and M–C bonds: Beyond a side reaction**

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1. Introduction

2. Brief overview: early studies

2.1. P–aryl/P–aryl exchange: a side reaction

3. Elementary steps for phosphine activation

3.1. Direct oxidative addition of neutral P–C bonds

3.2. P–C bond formation through formation of phosphonium intermediates via reductive elimination

3.3. P–C bond cleavage through oxidative addition of phosphonium intermediates

4. Current research trends

4.1. P–aryl/P–aryl exchange: beyond a side reaction

5. Summary and outlook

Acknowledgements

References

Abstract

Phosphine ligands often play an important role in controlling reactivity and selectivity in transition metal catalyzed reactions. However, one common drawback of the phosphine ligands is the undesired occurrence of an interchange between P bound aryl and M bound aryl or alkyl groups in the catalytic cycle. This results in the formation of undesirable coupling products as well as changes in catalyst structure through the replacement of the phosphine ligand. This review discusses approaches to

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REGULAR ARTICLE

Response of *Populus tremula* to heterogeneous B distributions in soil

Rainer Rees · Brett H. Robinson · Michael W. H. Evangelou · Eberhard Lehmann · Rainer Schulin

Rec[illegible]16 November 2011 / Accepted: 10 February 2012 / Published online: 8 March 2012

Abstract
Background Poplars accumulate inordinate amounts of B in their leaves and are candidate plants for the remediation of B contaminated soil. We aimed to determine the effect of heterogeneous B distribution in soil by comparing the growth and B accumulation of young *Populus tremula* trees growing in soil with heterogeneous and homogeneous B distributions.
Methods The first of two experiments focused on the tolerance and B accumulation of *P. tremula* under heterogeneous soil B distributions, while the second was designed to study fine root growth under such conditions in detail.
Results Growth and B accumulation of *P. tremula* were unaffected by the spatial distribution of B. Root and shoot growth were both reduced simultaneously when leaf B concentrations increased above 800 mg kg^{-1}. In the heterogeneous soil B treatments, root growth was more reduced in spiked soil portions with B concentrations >20 mg kg^{-1}. Fine root length growth was stronger inhibited by B stress than secondary growth.
Conclusions The root growth responses of *P. tremula* to B are primarily a systemic effect induced by shoot B toxicity and local toxicity effects on roots become dominant only at rather high soil B concentrations. Local heterogeneity in soil B should have little influence on the phytoremediation of contaminated sites.

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Keywords Boron · Heterogeneity · Local and systemic response · Root traits

Abbreviations
B Boron

How to publish open access

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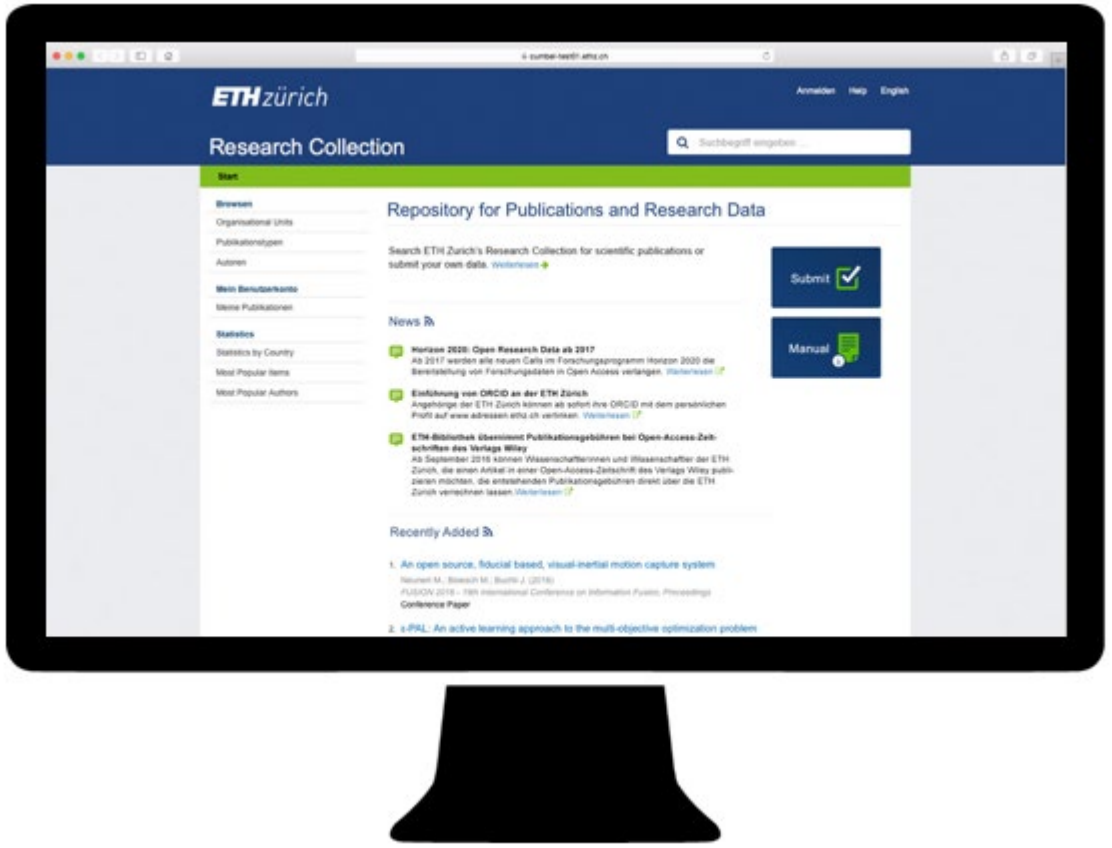

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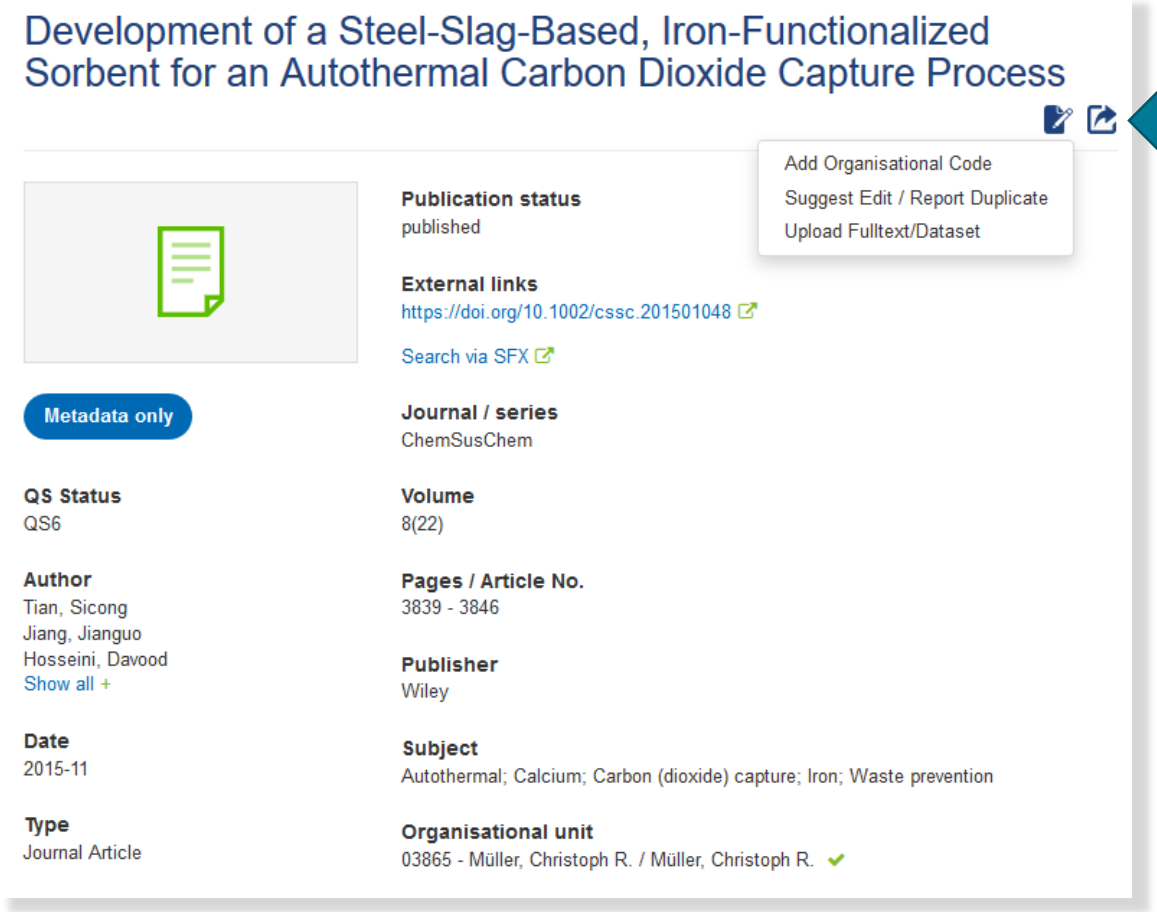

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Thanks for your attention!

Next Coffee Lecture:

Data Management Plan (DMP) for the SNSF: what does it mean for me?

26 September 2020, Webinar via Zoom
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