Ion Irradiation of 2D Materials: What we can learn from experiments (and what we cannot learn)

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Abstract

Ion irradiation is an established technology to modify 3D materials. By tuning the ion beam parameters, a wide range of changes can be achieved with atomic scale precision. For 2D materials, where defects play an even more decisive role for the materials' properties, this efficient tool needs to be revisited [1]. The absence of a bulk, the extreme sensitivity to environmental conditions, and of course their vanishingly small extension in one dimension have a fundamental influence on the ion-solid interaction because both, the primary excitation as well as the subsequent mass and energy transport are affected. A number of experiments has addressed the effect of ion irradiation of 2D materials by post-mortem analysis and in some cases complementary theoretical studies have provided insight into the underlying mechanisms. This is however still rather the exception than the rule and in my presentation I will give examples from literature and our own work, where appropriate computer simulations could be the key to understand and interpret the experimental findings.

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[1] M. Schleberger and J. Kotakoski, Materials **11**, 1885 (2018).

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