Contribution ID: **24** Type: **Poster**

# Buckling of NbSe2 thin films

*Wednesday 7 January 2026 09:45 (30 minutes)*

Thin films under strain and with low interfacial adhesion are known to buckle and delaminate from their substrates [1,2]. While buckling has previously been reported in $MoS_2$ films grown on x-cut $SiO_2$, there are few reports of this phenomenon in other TMDCs or in films only a few tens of nanometers thick. Here, we present the first observation of buckling in MBE-grown $NbSe_2$ thin films (10–15 nm) on c-cut $SiO_2$ substrates. When exposed to high humidity in the ambient air, the epitaxial $NbSe_2$ films tend to buckle and form quasi-periodic structures valleys and ridges with heights of 150–200 nm and an average spacing of 2.6 μm. This causes a color change from gray to blue, presumably due to collective interference effect similar to structural colors in photonic crystals. The buckled films were analyzed using AFM, XRD and SEM, and their electrical transport properties were measured before and after buckling. Because the $NbSe_2$ is highly strained at the top of the buckled structures, these features may offer a platform for probing local strain-dependent changes in electronic properties such as superconductivity and charge density wave formation.

[1] Wang, E., Chen, Z., Shi, R., Xiong, Z., Xin, Z., Wang, B., Guo, J., Peng, R., Wu, Y., Li, C., Ren, H., Li, X., & Liu, K. (2022). Humidity-Controlled Dynamic Engineering of Buckling Dimensionality in MoS2Thin Films. ACS Nano, 16(9), 14157–14167. https://doi.org/10.1021/acsnano.2c04203
[2] Ren, H., Xiong, Z., Wang, E., Yuan, Z., Sun, Y., Zhu, K., Wang, B., Wang, X., Ding, H., Liu, P., Zhang, L., Wu, J., Fan, S., Li, X., & Liu, K. (2019). Watching Dynamic Self-Assembly of Web Buckles in Strained MoS 2 Thin Films. ACS Nano, 13(3), 3106–3116. https://doi.org/10.1021/acsnano.8b08411

## email address

nicolas.brunner@unifr.ch

## Affiliation

University of Fribourg

**Author:** BRUNNER, Nicolas (University of Fribourg)

**Presenter:** BRUNNER, Nicolas (University of Fribourg)

**Session Classification:** Wednesday Coffee Break & Poster

**Track Classification:** Categories: van der Waals experimental