Motivation

- Diamond has exceptional figures of merit due to its wide band gap, high breakdown voltage, high thermal conductivity, and high carrier mobility.
- Despite its great potential, it is scarcely studied as a platform for robust transistors and sensors.

Background

- Hydrogen-terminating the diamond surface lowers vacuum energy level to below the conduction band minimum.
- Surface acceptors produce a high carrier concentration of holes.

Goal

- To develop a model for the hole mobility on hydrogen-terminated diamond.
- To use this model, validated with experimental data, to gain insight on the conduction limitations of hydrogen-terminated diamond.

Results & Conclusion

- The Hall measurements at low-to-intermediate temperatures suggest that long-range potential fluctuations exist for a wide range of 2D hole concentrations. This contributes to the ceiling observed for the hole mobilities.
- These fluctuations may arise both from charged surface acceptors and disorder related to the C-H surface.
- The nature of this disorder is a subject that remains to be studied.