

Ultra-clean ZnO heterostructures exploring novel quantum physics

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ZnO could be the cleanest semiconductor across the globe. Since ZnO is an “oxide”, oxygen is no longer impurity that has been the most undesired element for conventional semiconductors. We show our effort for making ZnO/MgZnO heterostructure clean, achieving an electron mobility over a million  $\text{cm}^2/\text{Vs}$ . We discovered numbers of novel quantum phenomena such as new fractional quantum Hall effect [1, 2], anomalous Hall effect in non-magnetic quantum well [3] and Wigner crystallization [4, 5].

[1] J. Falson et al, *Nature Physics* **11**, 347 (2015).

[2] J. Falson et al, *Science Advances* **4**, eaat8742 (2018).

[3] D. Maryenko et al, *Nature Communications* **8**, 14777 (2017).

[4] D. Maryanko et al, *Nature Communications* **9**, 4356 (2018).

[5] J. Falson et al, *Nature Materials* **21**, 311 (2022).