

Discovery of Type II interlayer trions

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ABSTRACT: In this work, we report the first observation of Type II interlayer trions by exploring band alignments and choosing an atomically thin organic-inorganic system-monolayer WSe₂/bilayer pentacene heterostructure (1L + 2L HS). Both positive and negative Type II interlayer trions are electrically tuned and observed *via* PL spectroscopy. In particular, Type II interlayer trions exhibit in-plane anisotropic emission, possibly caused by their unique spatial structure and anisotropic charge interactions, which is highly correlated with the transition dipole moment of pentacene. Our results pave the way to develop excitonic devices and all-optical circuits using atomically thin organic-inorganic bilayers.



Short Bio: Associate Professor Zhang Linglong has received his PhD degree in 2019 at Nanjing University (supervisor: Prof SHI Yi & Prof WANG Xinran), and conducted postdoctoral research at Australian National University (supervisor: Prof LU yuerui). Currently, he is an associate researcher at Nanjing University of Aeronautics and Astronautics. His research interests include 2D materials and novel nanooptoelectronics. To date, he has published over 20 papers in high-impact journals, including *Science Advances*, *Nature Communications*, *Advanced Materials*, and *Materials*

Today, etc.