



Wolfson Department of Chemical Engineering Seminar

Monday, September 8th, 2025 at 13:30

Conference Room - 3rd floor

**Synthesis of exposed oxide heterointerfaces in porous materials using
area-selective atomic layer deposition**

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MSc Seminar

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Different oxide support materials govern metal catalyst stability and activity in distinct ways. In many heterogeneous catalysts, these properties do not align and instead exhibit a trade-off between stability during reaction and the desired activity. Recent studies have shown that designing catalyst support materials with exposed heterointerfaces can better balance catalyst performance. Simply put, a heterointerface is formed at the boundary between different oxides, but its properties are distinct and unique compared to those of the parent bulk oxides. The aim of my research is to develop a versatile method for synthesizing exposed heterointerfaces in high-surface-area materials using area-selective atomic layer deposition (AS-ALD). This technique enables control over the composition, thickness, and spatial distribution of oxide domains. The first part of my study explores the development of an ALD inert screening method to enable area-selective deposition. This was achieved by growing NaCl crystallites on a Si wafer to block the covalent bonding of the ALD metal precursor in specific regions. I will show that upon removing the NaCl, craters remain on the Si wafers, effectively forming heterointerfaces along their edges. In the second part of my talk, I demonstrate the application of this method for the selective growth of TiO₂ on high-surface-area mesoporous silica, offering a more practical approach for catalytic applications.

Refreshments will be served at 13:15.