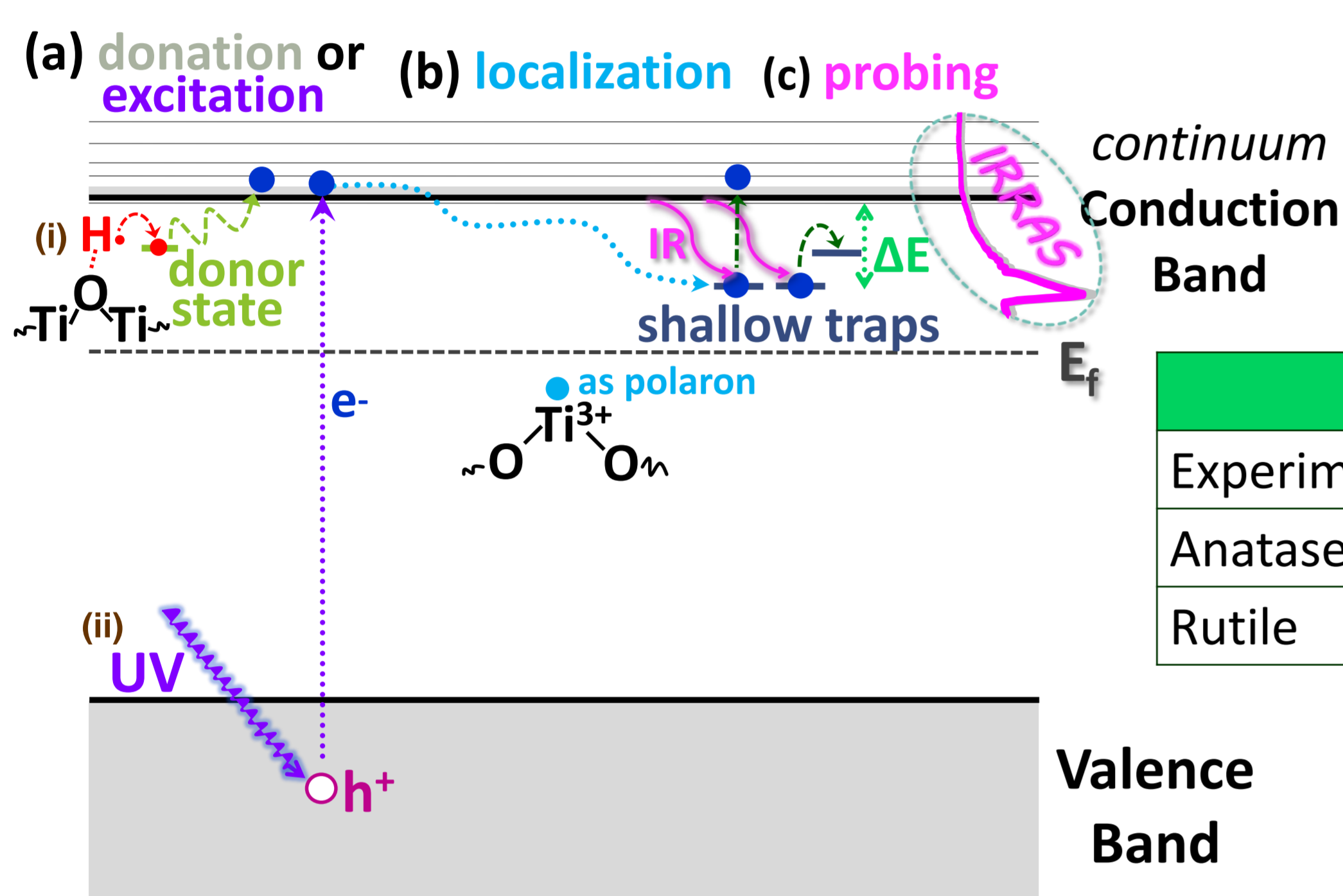


# Probing Shallow Trapped Electrons of TiO<sub>2</sub> with UHV-IRRAS

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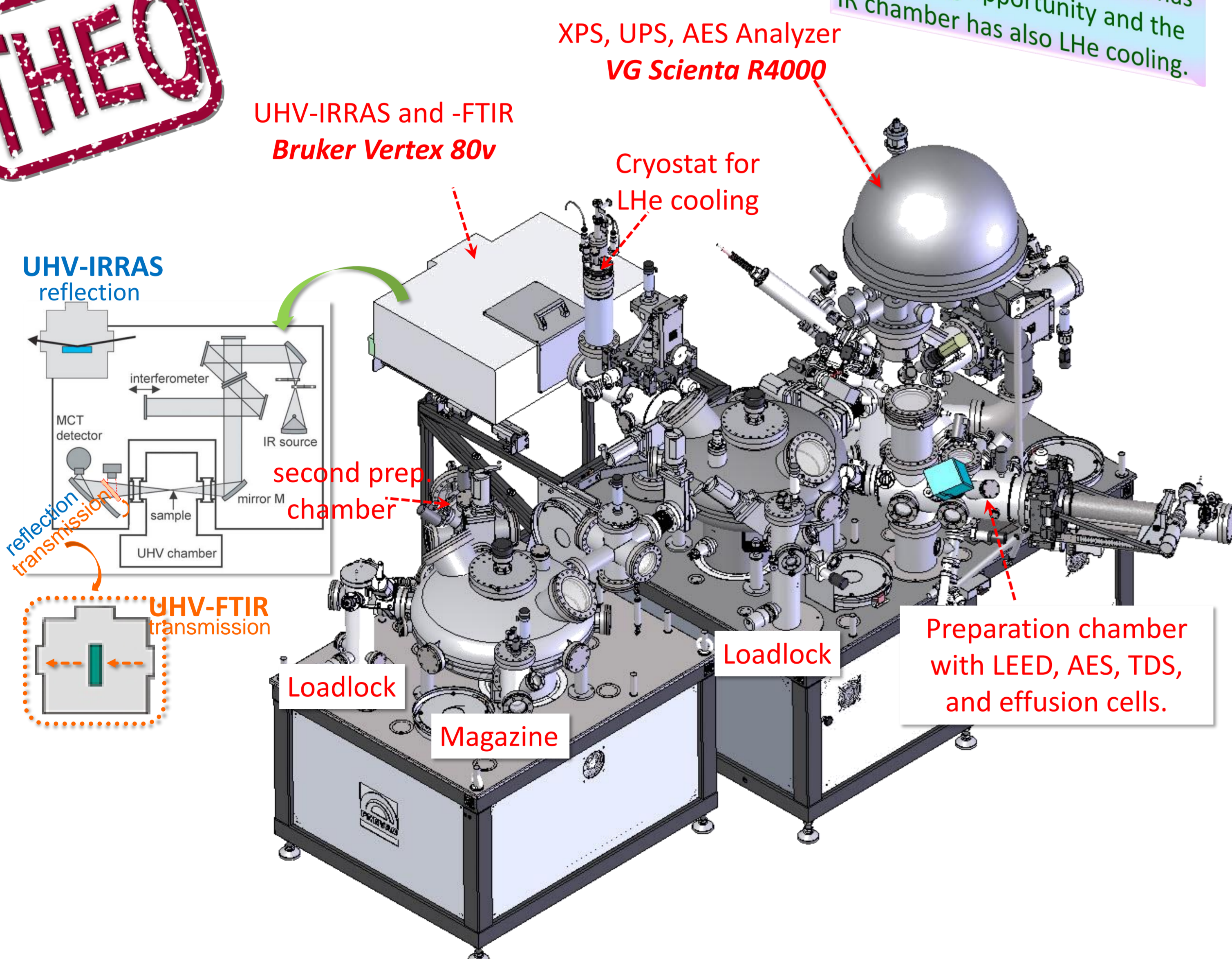
## 1 Scope

Probing trapped shallow state electrons loaded from both atomic hydrogen and UV treatments on powder and single crystal TiO<sub>2</sub> samples by a novel method of the infrared reflection absorption spectroscopy in an ultrahigh vacuum environment (UHV-IRRAS).<sup>[1-2]</sup> However, now we have a more furnished UHV system at KIT, which is called THEO!



## 2 Instrumental

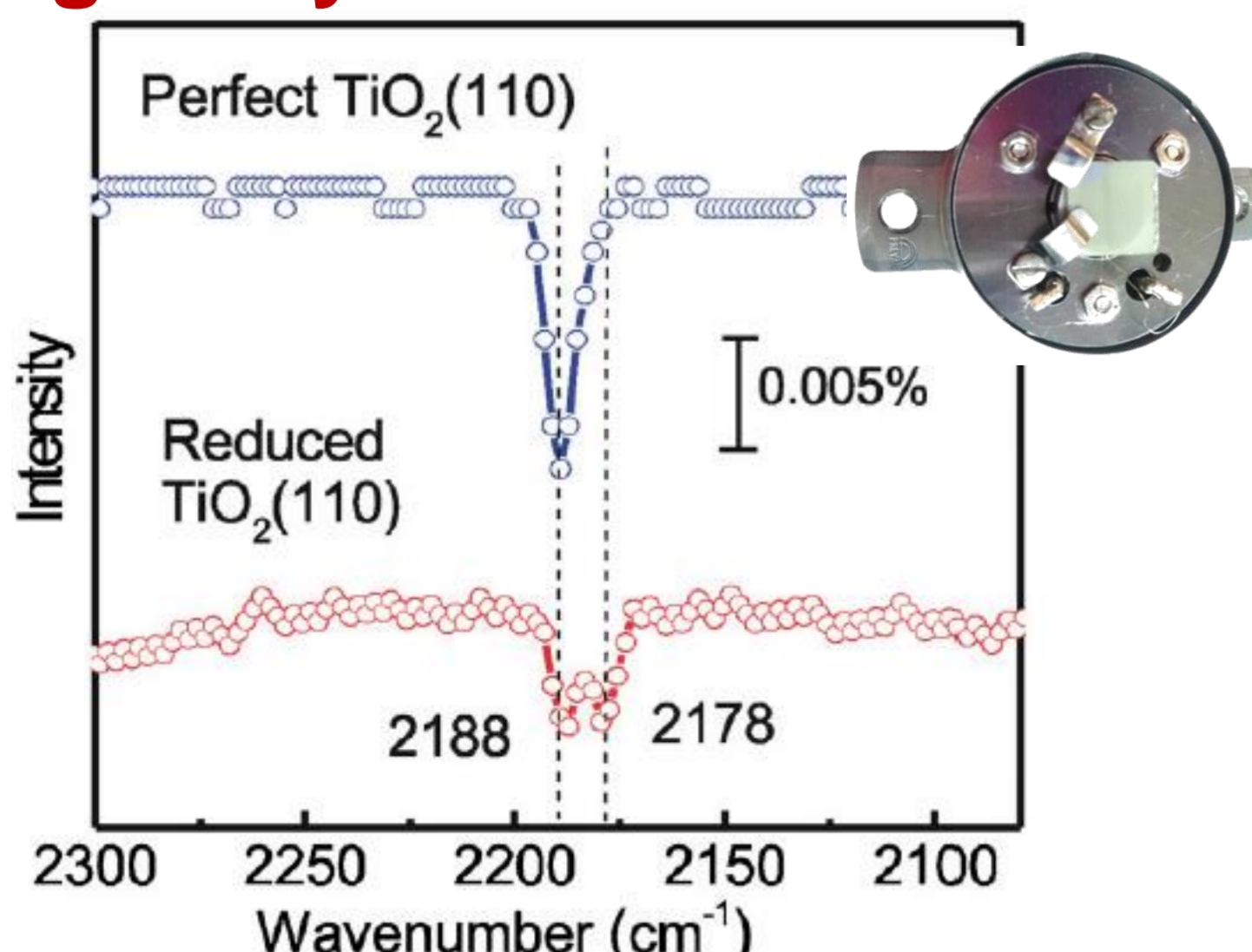
**THEO**



### Performance of the system: CO adsorption on r-TiO<sub>2</sub><sup>[2]</sup>

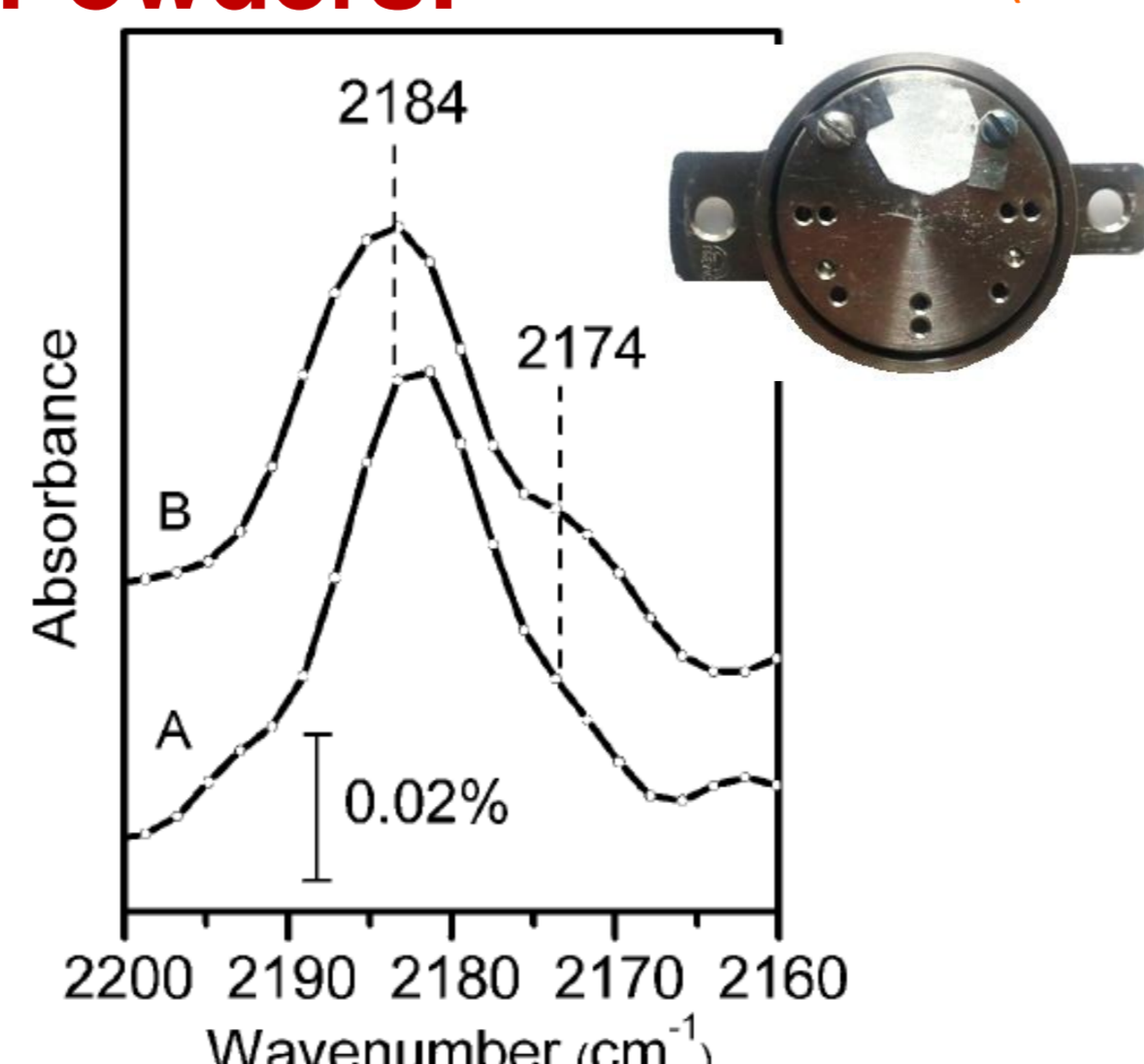
Single Crystals:

E-beam sample holder:  
ΔT: 1500K-100K (LHe 30K)

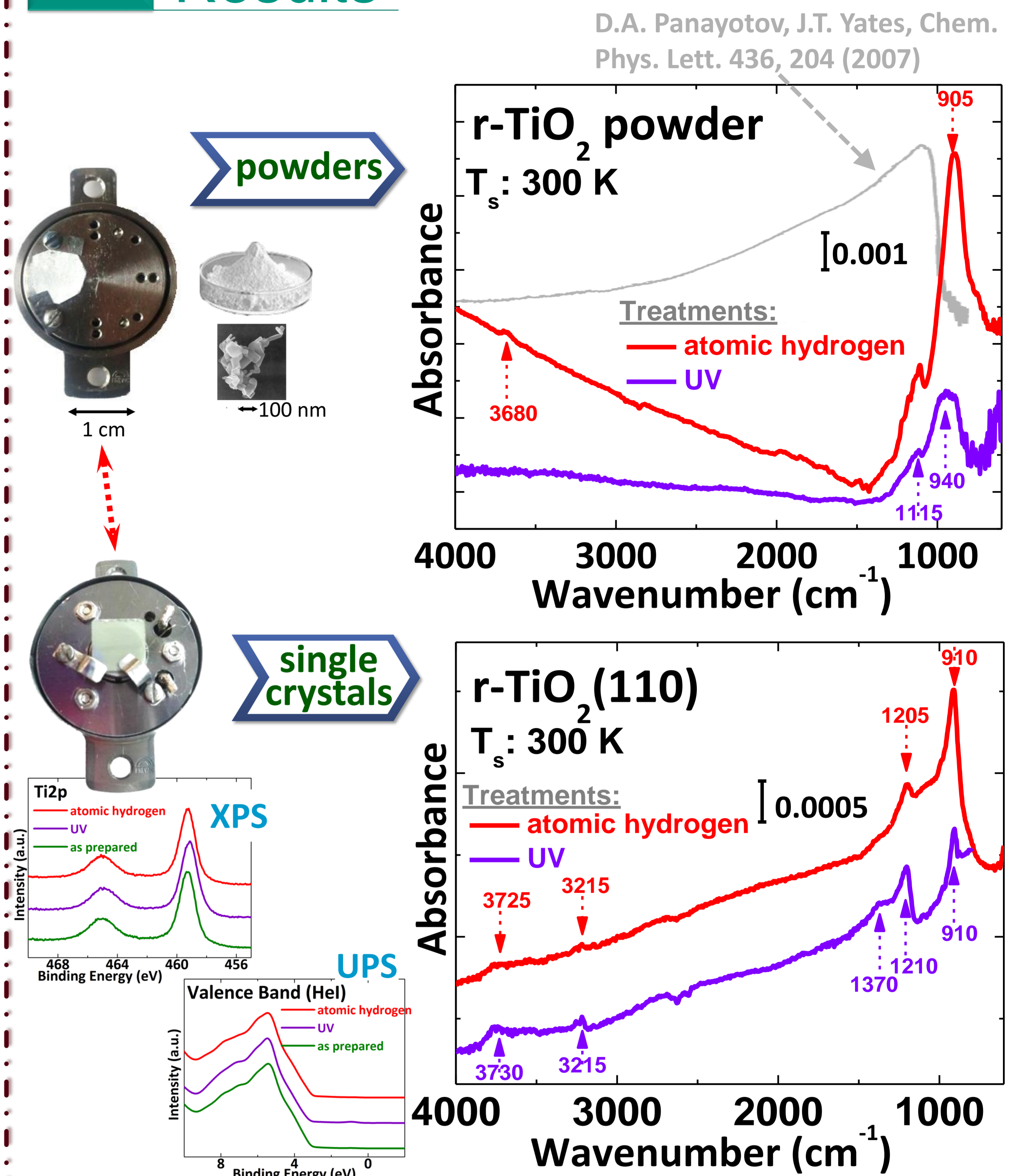


Powders:

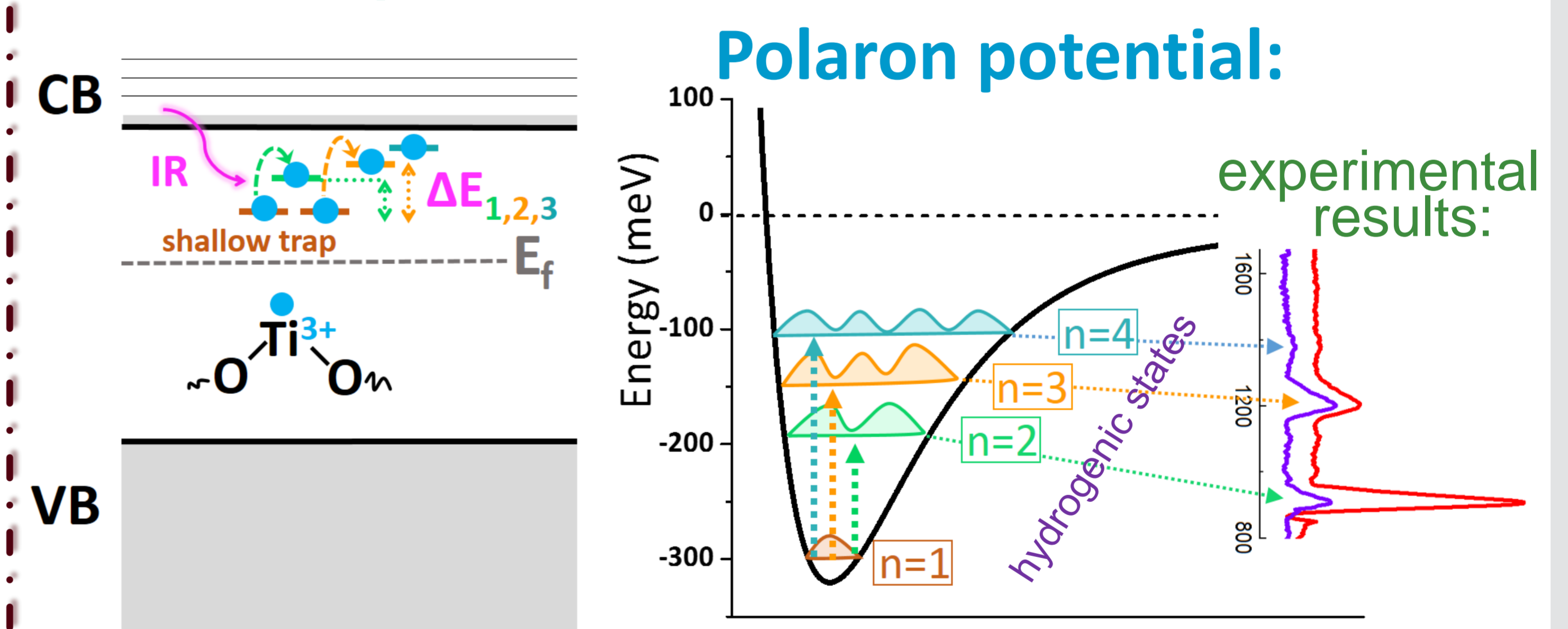
Transmission sample holder:  
ΔT: 1200K-100K (LHe 30K)



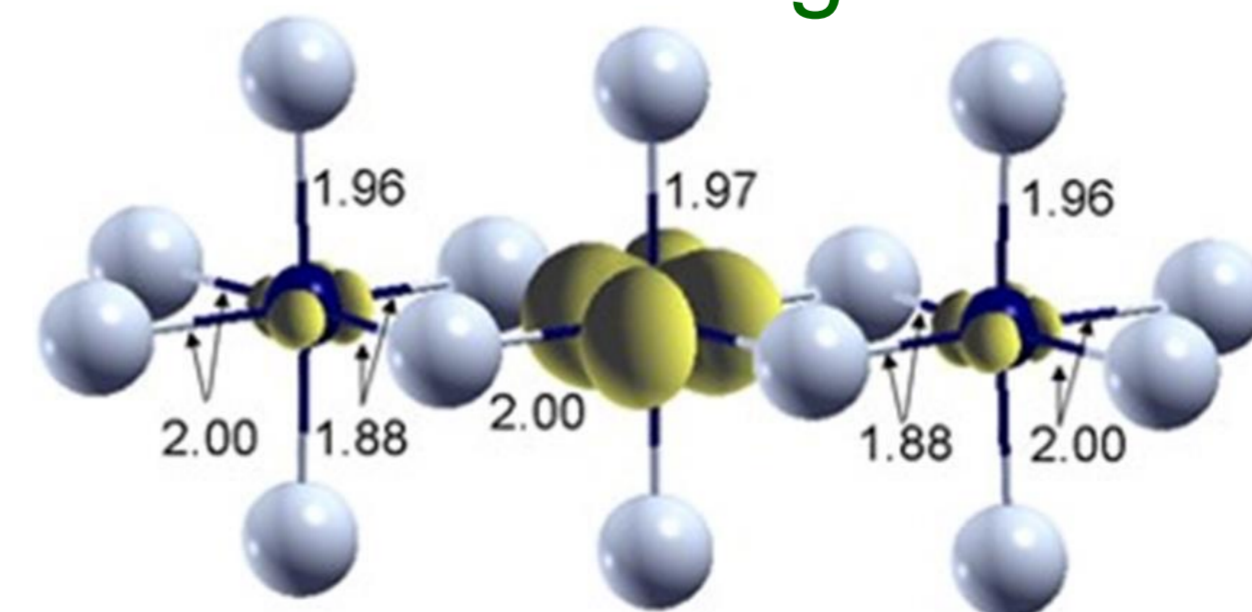
## 3 Results\*



## 4 Explanation\*



theoretical findings → intrinsic defect state



\*accepted for publication  
in Scientific Reports

## 5 References

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- 2.) M. Xu, H. Noei, K. Fink, M. Muhler, Y. Wang, C. Wöll, Angew. Chem. Int. Ed. 51, 4731 (2012)
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