

Iván Cerrillo,
Postgraduate student
Aberystwyth



IHP Research Training Network



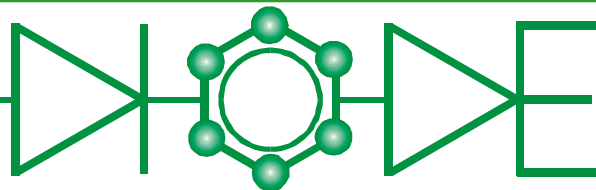
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- Background
- Techniques
- Role in this network.
- Collaborations.
- Conclusion.



Background

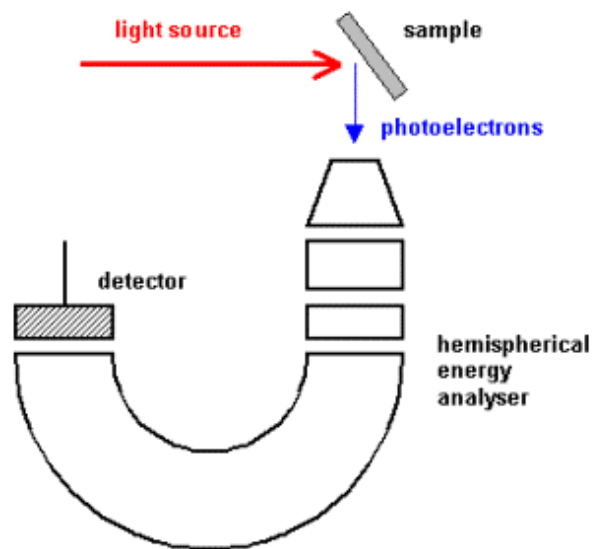
- 1994-1996 **Chemistry**. Universidad Complutense de Madrid.
- 1996-2001 **Physics Degree**. Universidad Autónoma de Madrid.
- 1999-2000 **Erasmus Project**. Università degli Studi di Pisa. Italy
- 2001-2002 Research Training. **DIODE** project.



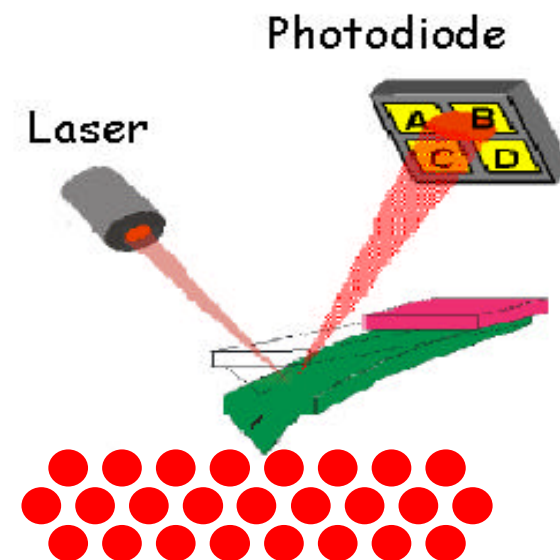


Techniques

- XPS
- AFM
- STM



XPS

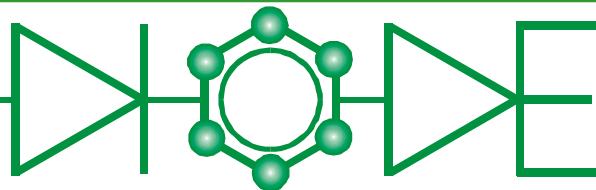


AFM



Characterization of sample surface:

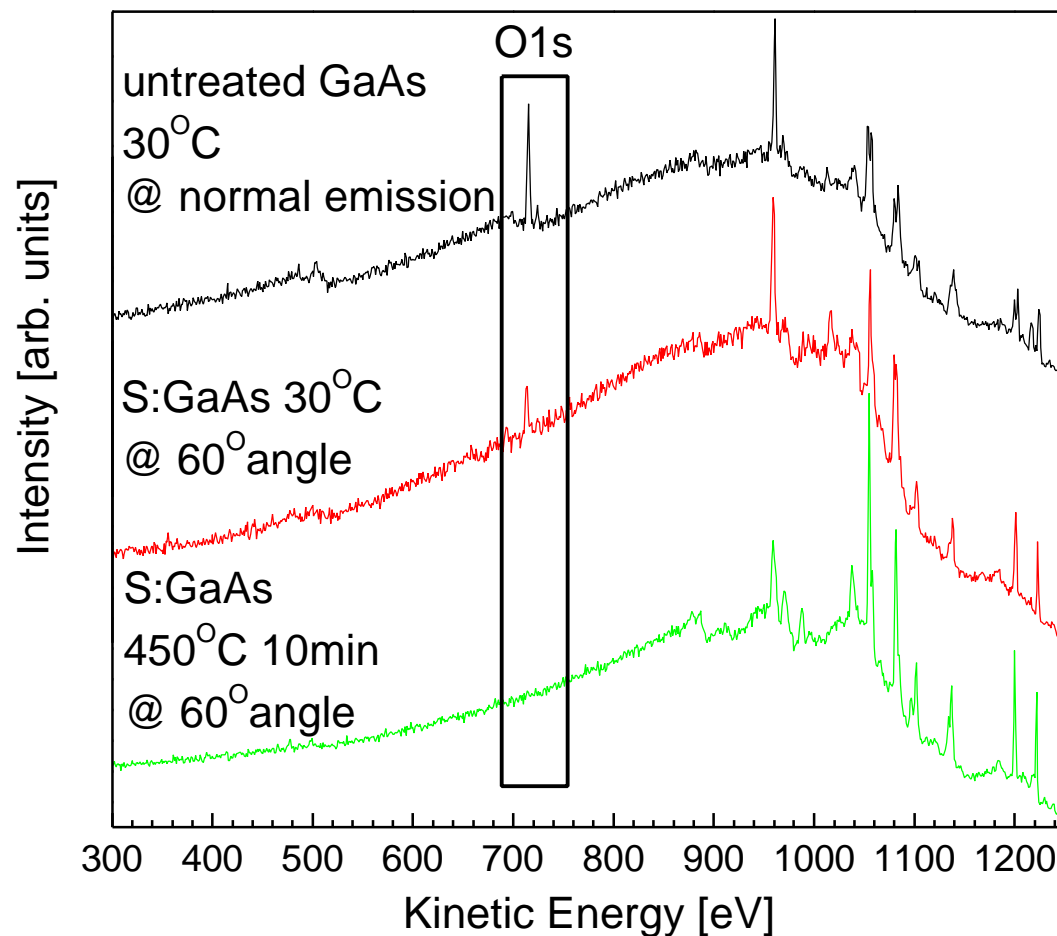
- S:GaAs (001) prepared by two methods:
 - Molecular Beam Epitaxy (MBE) growth followed by sulfur evaporation.
 - Chemical etching, two treatments
 $\text{S}_2\text{Cl}_2 + \text{CCl}_4$ solution in 1:3 proportion, for 15 s.
(Chemnitz method)
 $\text{S}_2\text{Cl}_2 + \text{CH}_2\text{Cl}_2$ solution in 1:11 proportion, for 2min.
(Aber method)
- PTCDA on sulfur passivated GaAs (001)



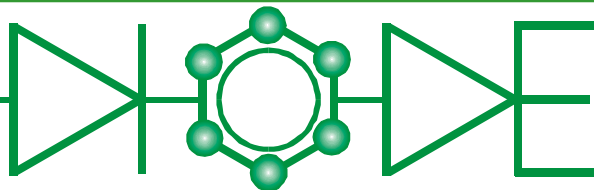


Prifysgol Cymru
Aberystwyth
The University of Wales

Oxygen Removal (XPS)



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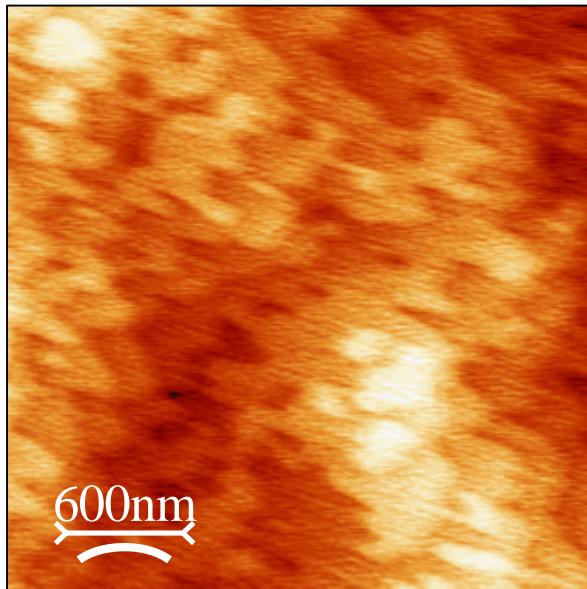


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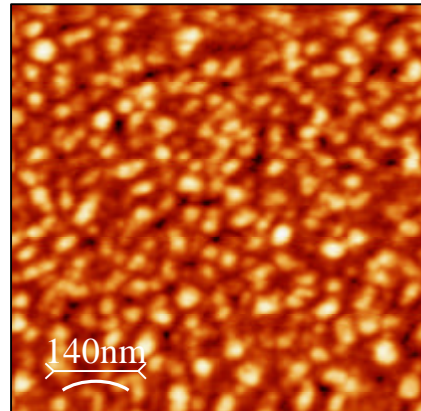
Sulfur passivated GaAs (001) substrates

- MBE



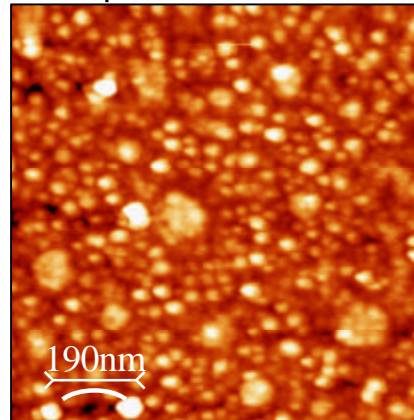
Size $3\mu\text{m} \times 3\mu\text{m}$
RMS roughness = 0.56 \AA

- $\text{S}_2\text{Cl}_2 + \text{CH}_2\text{Cl}_2$ (1:11) 2 min

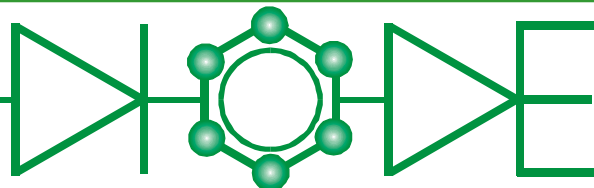


Size $715\text{nm} \times 715\text{nm}$
RMS roughness = 6 \AA

- $\text{S}_2\text{Cl}_2 + \text{CCl}_4$ (1:3) 15 s

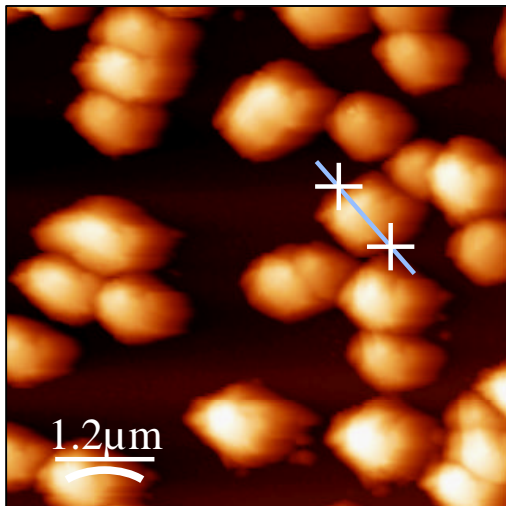


Size $933\text{nm} \times 933\text{nm}$
RMS roughness = 5.5 \AA

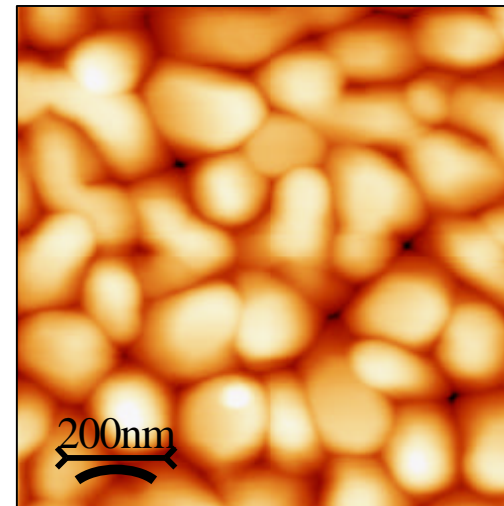


PTCDA on Sulfur passivated GaAs (001)

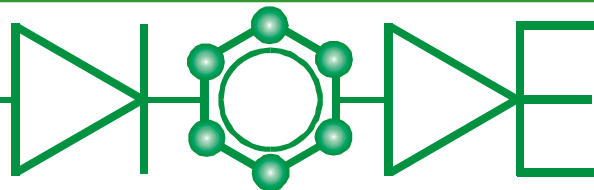
- PTCDA on etched S:GaAs (001)



Size 6,2 μm x 6,2 μm
Aggregates. Diam~1 μm, high~370 nm



Size 1 μm x 1 μm, 100 ML of
PTCDA

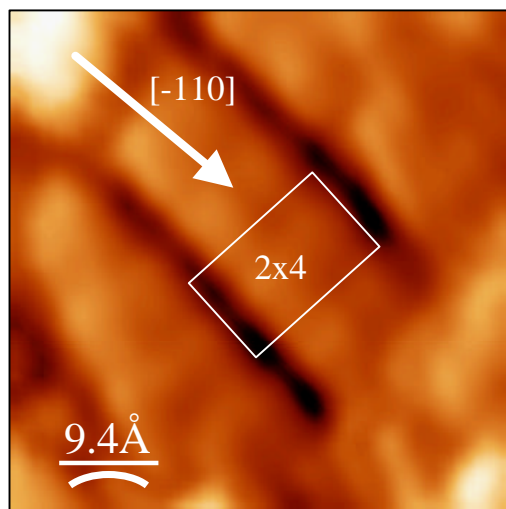


- Madrid Group. Nicoleta Nicoara.
- Chemnitz Group. Georgeta Salvan and Gianina Gavrilă.



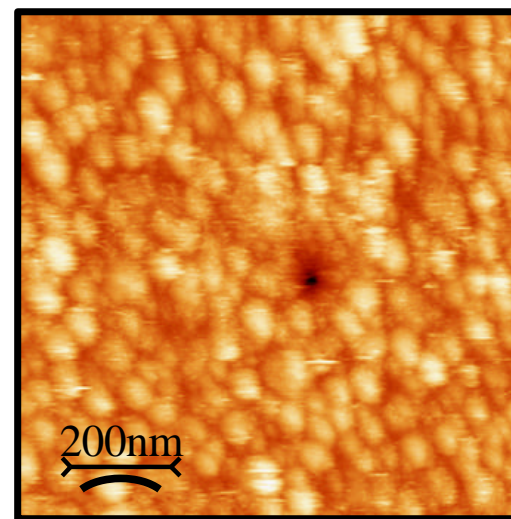
Madrid group. Nicoleta Nicoara.

- GaAs (MBE)

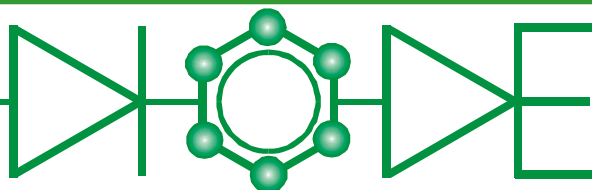


Size 4,7nm x 4,7nm

- PTCDA on S:GaAs
(Chemical etching)

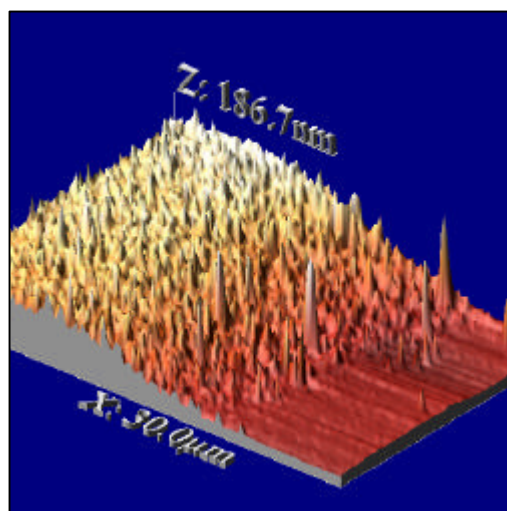


No molecular periodicity was observed



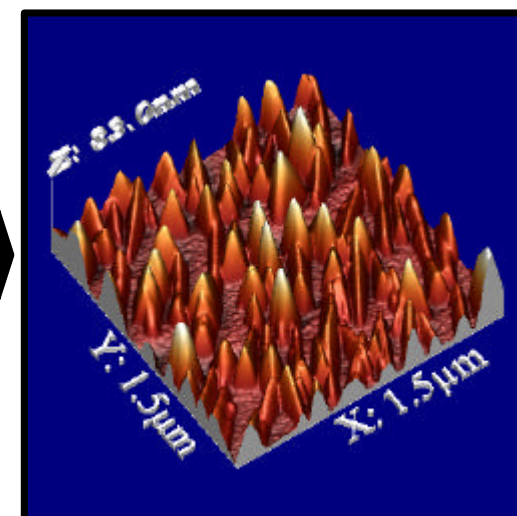
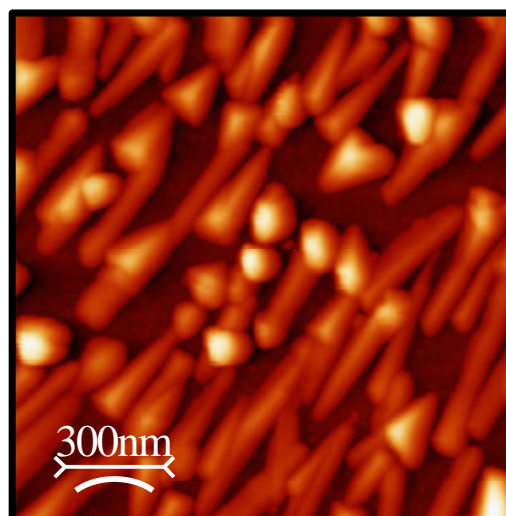
Chemnitz Group. Georgeta Salvan and Gianina Gavrila

- DiMePTCDI on S:GaAs 305ML



Averaged step ~98nm

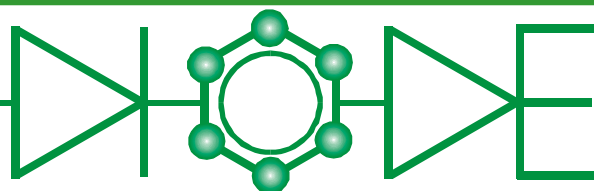
- DiMePTCDI on S:GaAs 20ML



Highest row ~ 60 nm,
Long ~ 450 nm



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STM and AFM Training

DIODE-Training Workshop

STM, AFM and Theoretical Simulations

Madrid, 22th - 26th April 2002



Universidad Autónoma de Madrid



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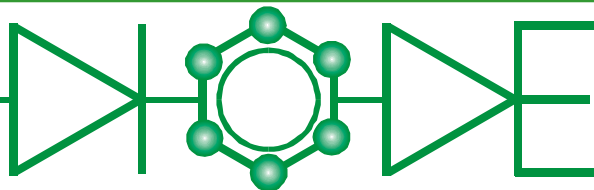
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Conclusions

- PTCDAs growth depends on substrate treatment.
- Possibility to work in other nodes.
- Nice experience to work with friendly people from other European countries.



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