Stefano Vichi | Curriculum Vitae

*I have a PhD in Materials Science and Nanotechnology. I am currently working in the field of III-V semiconductors and in particular arsenides and nitrides. My main experience is in the MBE and MOVPE growth of semiconductors. I have experience in different types of semiconductors characterization techniques (morphological, structural and emission properties). I have experience in finite-elements numerical simulations of electrical and quantum properties of devices and nanostructures and in particular single-electron k*p and envelope function approximations.*

Personal informations

Date of Birth: 06/09/1993
Nationality: Italian
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Academic positions

Assistant professor — **Milan, Italy**
Università degli Studi di Milano-Bicocca — 01/07/2023 – current
Support: Project ID 2023-RTDAPNRR-022/2

Postdoctoral researcher — **Milan, Italy**
Università degli Studi di Milano-Bicocca — 01/02/2023 – 30/06/2023
Support: Project ID 2016-NAZ-0132/A/PER

Postdoctoral researcher — **Milan, Italy**
Istituto Nazionale di Fisica Nucleare, Sezione di Milano-Bicocca — 08/02/2021 – 31/01/2023
Support: Project ID POR FESR 2014-2020

Research fellow — **Milan, Italy**
Università degli Studi di Milano-Bicocca — 01/09/2019 – 31/08/2020
Support: Project ID 2016-NAZ-0132/A/PER

Research fellow — **Milan, Italy**
Università degli Studi di Milano-Bicocca — 01/03/2018 – 31/08/2019
Support: Project ID 2016-NAZ-0132/A/PER

Education

PhD in Material Science and Nanotechnology — **Milan, Italy**
Università degli Studi di Milano-Bicocca — 01/10/2017 – 17/02/2021
Title: *Bandgap and Intrinsic Electric Field Engineering in Nitrides: Towards Efficient Red LEDs*
Supervisor: Prof. Stefano Sanguinetti

Special Research Student of the Graduate School of Engineering, Nagoya University — **Nagoya, Japan**
Graduate School of Engineering, Nagoya University — 01/04/2020 – 29/06/2020 (cancelled)
Topic: *Improvement of the efficiency of visible long wavelength LEDs*

Academic Advisor: Prof. Hiroshi Amano
cancelled due to Covid-19 restrictions

Special Research Student of the Graduate School of Engineering, Nagoya University — **Nagoya, Japan**
Graduate School of Engineering, Nagoya University — 01/07/2018 – 26/09/2018
Topic: *Crystal growth of GaN by MOCVD and characterization of the grown crystal*
Academic Advisor: Prof. Hiroshi Amano

Master degree in Physics — **Milano, Italy**
Università degli Studi di Milano-Bicocca — 2015-2017
Title: *Design and Characterization of Quantum Dot Infrared Photodetectors*
Supervisors : Prof. Stefano Sanguinetti, Dr. Sergio Bietti
Final degree mark : 110/110 cum laude

Bachelor degree in Physics — **Milano, Italy**
Università degli Studi di Milano-Bicocca — 2012-2015
Title: *Bidimensional MoS2: a direct bandgap semiconductor*
Supervisors : Prof. Emanuele Grilli, Prof. Fabio Pezzoli
Final degree mark : 109/110

Teaching and Mentoring

Laboratory of Solid State and Quantum Technologies I — 2023
Instructor

Solid State Physics Laboratory — 2019, 2021
Assistant (unofficial position)

Mentoring
1 Bachelor student, 7 Master students, 1 Undergraduate Course Internship student

Service

Guest editor — 2022
Materials special issue "*Semiconductor Materials for Optoelectronic Device Applications*"

Assistant guest editor — 2022
Nanomaterials special issue "*Quantum Nanostructures by Droplet Epitaxy for Optoelectronics and Quantum Information Technologies II*"

Memberships

MBE group of Prof. Sanguinetti — 2018 - current
Tasks: Theoretical modeling, growth and characterization of optical devices based on nanostructures:

- Quantum dot infrared photodetectors based on (Al,Ga)As.
- Long wavelength LED based on (Al,In,Ga)N quantum wells.
- High In-content InGaN nanocolumns for hydrogen production and chemical sensing

Pignoletto project — 2021 - 2023
Task: *Design and manufacture of materials for thermal infrared detectors based on quantum semiconductor nanostructures*

Prof. Sanguinetti's assistant during undergraduate student internship 2021
Task: *Designing a quantum dot that will be a single-photon emitter with a wavelength of 1.55 µm on a simulation.*
Unofficial position

Prof. Sanguinetti's assistant during University laboratory class 2019, 2021
Task: *Photoluminescence measurements and analysis*
Unofficial position

Teinvein project 2018 - 2020
Task: *Development of Innovative Molecular Beam Epitaxy Growth Procedures for Arsenides Semiconductors on Silicon*

Conferences

1. ***ICNS 2019***, 9-11 April 2019, Poster presentation
   The Effect of Al(Ga)N Capping Layers in InGaN/GaN Quantum Wells Emitting from Green to Red
   S. Vichi*, Y. Robin, S. Sanguinetti, M. Pristovsek, and H. Amano
2. ***ICMBE 2021***, 6-9 September 2021, Oral presentation
   Effect of the AlGaN Capping Layer on the Emission Properties of InGaN Quantum Wells
   S. Vichi*, S. Sanguinetti, M. Pristovsek, and H. Amano
3. ***SemiconNANO 2021***, 30 August-3 September 2021, Oral presentation
   Effect of the AlGaN Capping Layer on the Emission Properties of InGaN Quantum Wells
   S. Vichi*, S. Sanguinetti, M. Pristovsek, and H. Amano
4. ***SemiconNANO 2021***, 30 August-3 September 2021, Oral presentation
   Droplet Epitaxy Quantum Dots on GaAs(111) Substrates for Quantum Information Applications
   A. Tuktamyshev*, A. Fedorov, S. Bietti, **S. Vichi**, S. Tsukamoto, and S. Sanguinetti
5. ***ICMBE 2022***, 4-9 September 2022, Oral presentation
   Room temperature dual-band quantum dot infrared photodetector
   S. Bietti, **S. Vichi**, F. Basso Basset, A. Tuktamyshev, A. Fedorov, M. Crivellari, M. Boscardin, and S. Sanguinetti*
6. ***ICMBE 2022***, 4-9 September 2022, Oral presentation
   Cavity-enhanced low fine-structure splitting telecom-wavelength InAs QDs grown on a GaAs(111)A vicinal substrate
   A. Tuktamyshev, A. Barbiero, G. Pirard, J. Huwer, T. Müller, R. M. Stevenson, S. Bietti, **S. Vichi**, A. Fedorov, D. Chrastina, G. Bester, A. J. Shields, and S. Sanguinetti*
7. **EuroMBE 2023**, 16-19 April 2023, Oral presentation
   Enhancing intermediate band solar cells performances through quantum engineering of dot states by Droplet Epitaxy
   A. Scaccabarozzi, **S. Vichi***, S. Bietti, F. Cesura, T. Aho, M. Guina, F. Cappelluti, M. Acciarri and S. Sanguinetti

* presenter

Full publication list

1. F. Cesura, **S. Vichi**, A. Tuktamyshev, S. Bietti, A. Fedorov, S. Sanguinetti, K. Iizuka, S. Tsukamoto, *Droplet free self-assembling of high density nanoholes on GaAs(100) via thermal drilling*, Journal of Crystal Growth 630, 127588, (2024)
2. A. Scaccabarozzi, **S. Vichi***, S. Bietti, F. Cesura, T. Aho, M. Guina, F. Cappelluti, M. Acciarri, S. Sanguinetti, *Enhancing intermediate band solar cell performances through quantum engineering of dot states by droplet epitaxy*, Prog Photovolt Res Appl;1–8 (2023).
3. A. Tuktamyshev, **S. Vichi**, F. Cesura, A. Fedorov, S. Bietti, D. Chrastina, S. Tsukamoto, S. Sanguinetti, *Flat metamorphic InAlAs buffer layer on GaAs(111)A misoriented substrates by growth kinetics control*, Journal of Crystal Growth 600, 126906, (2022).
4. M. Azadmand, **S. Vichi***, F.G. Cesura, S. Bietti, D. Chrastina, E. Bonera, G.M. Vanacore, S. Tsukamoto, S. Sanguinetti, *Vapour Liquid Solid Growth Effects on InGaN Epilayers Composition Uniformity in Presence of Metal Droplets*, Nanomaterials 12, 3887, (2022).
5. **S. Vichi***, S. Bietti, F. Basso Basset, A. Tuktamyshev, A. Fedorov, S. Sanguinetti, *Optically controlled dual-band quantum dot infrared photodetector*, Nanomaterials and Nanotechnology 12, (2022).
6. A. Tuktamyshev, **S. Vichi**, F.G. Cesura, A. Fedorov, G. Carminati, D. Lambardi, J. Pedrini, E. Vitiello, F. Pezzoli, S. Bietti, S. Sanguinetti, *Strain Relaxation of InAs Quantum Dots on Misoriented InAlAs(111) Metamorphic Substrates,* Nanomaterials 12, 3571, (2022).
7. A. Barbiero, A. Tuktamyshev, G. Pirard, J. Huwer, T. Müller, R.M. Stevenson, S. Bietti, **S. Vichi**, A. Fedorov, G. Bester, S. Sanguinetti, and A.J. Shields, *Exciton Fine Structure in InAs Quantum Dots with Cavity-Enhanced Emission at Telecommunication Wavelength and Grown on a GaAs (111)A Vicinal Substrate*, Physical Review Applied 18, 034081, (2022).
8. A. Tuktamyshev, A. Fedorov, S. Bietti, **S. Vichi**, R. Tambone, S. Tsukamoto, S. Sanguinetti, *Nucleation of Ga droplets self-assembly on GaAs(111)A substrates*, Scientific Reports 11, 6833, (2021).
9. A. Tuktamyshev, A. Fedorov, S. Bietti, **S. Vichi**, K.D. Zeuner, K.D. Jöns, D. Chrastina, S. Tsukamoto, V. Zwiller, M. Gurioli, S. Sanguinetti, *Telecom-wavelength InAs QDs with low fine structure splitting grown by droplet epitaxy on GaAs(111)A vicinal substrates*, Applied Physics Letters 118, 133102, (2021).
10. **S. Vichi**, *Bandgap and Intrinsic Electric Field Engineering in Nitrides: Towards Efficient Red LEDs*, PhD thesis, (2021).
11. **S. Vichi***, S. Bietti, A. Khalili, M. Costanzo, F. Cappelluti, L. Esposito, C. Somaschini, A. Fedorov, S. Tsukamoto, P. Rauter, S. Sanguinetti, *Droplet epitaxy quantum dot based infrared photodetectors*, Nanotechnology 31, 245203, (2020).
12. **S. Vichi***, Y. Robin, S. Sanguinetti, M. Pristovsek, H. Amano, *Increasing the Luminescence Efficiency of Long-Wavelength (In,Ga)N Quantum Well Structures by Electric Field Engineering Using an (Al,Ga)N Capping Layer*, Physical Review Applied 14, 024018, (2020).
13. F. Basso Basset, S. Bietti, A. Tuktamyshev, **S. Vichi**, E. Bonera, S. Sanguinetti, *Spectral broadening in self-assembled GaAs quantum dots with narrow size distribution*, Journal of Applied Physics 126, 024301, (2019).

14. A. Ballabio, S. Bietti, A. Scaccabarozzi, L. Esposito, **S. Vichi**, A. Fedorov, A. Vinattieri, C. Mannucci, F. Biccari, A. Nemcsis, L. Toth, L. Miglio, M. Gurioli, G. Isella, S. Sanguinetti, *GaAs epilayers grown on patterned (001) silicon substrates via suspended Ge layers*, Scientific Reports 9, 17529, (2019).

    * corresponding author