

Mentor CV Template

SECTION 1 –Details (max. 2 pages)

NAME AND CONTACT DETAILS: **Dr. Emanuele Pelucchi**; Tyndall National Institute, “Lee Maltings”, Dyke Parade, Cork; **Phone:** [REDACTED]; **Email:** emanuele.pelucchi@tyndall.ie

CAREER PROFILE (Education and Employment)

EDUCATION

University of Bremen and TASC National Laboratory (Trieste)

1997-2001

Ph.D. in Physics (Supervisor [REDACTED]). Thesis: “Interfacial issues in wide-bandgap II-VI materials and related multiple quantum well structures”.

Milan Polytechnic

1989-1995

Laurea (Master) “summa cum laude” in Electronic-Engineering (Physics and Mathematics channel)

EMPLOYMENT

Head of group

2013– present

Tyndall National Institute, University College Cork (UCC), Ireland

Senior Research Fellow

2008– present

Department of Physics, University College Cork, Ireland

Senior Researcher and SFI PI

2007–2013

Tyndall National Institute, University College Cork (UCC), Ireland

Research assistant

2001 – 2006

Laboratory of Physics of Nanostructures, Swiss Federal Institute of Technology Lausanne

Research assistant

2001

TASC-INFM National Laboratory, Trieste (Italy).

Second Lieutenant, Italian Army.

1996-1997

KEY ACHIEVEMENTS IN RESEARCH EXCELLENCE & IMPACT

A. Key Achievements in the Generation of Knowledge Dr. Pelucchi has very broad interests, spanning from surface science and epitaxy to quantum optics. He has developed world leading III-V material quality (especially in the field of photonic integration) while uniquely developing and demonstrating arrays of site-controlled quantum dots and entangled photon emitters. He established at Tyndall National Institute what should be considered as the purest metalorganic vapour phase epitaxy (MOVPE) kit worldwide, strategically supporting the national effort in photonic integration and demonstrating material with optical properties comparable to the best produced by molecular beam epitaxy (MBE). He is also a world expert in epitaxy on patterned substrates. He has disseminated his results by publishing in a number of major reviews such as: Nature, Nature Photonics, NanoLetters, Physical Review Letters, Applied Physics Letters, Physical Review B etc.. and by contributing to relevant international fora, including a significant number of invited presentations (>50).

1) His group has pioneered site-controlled quantum dots (QDs) development for quantum information applications and published the most advanced and complete model to date for MOVPE growth in recessed patterns, such as V-groove quantum wires and Pyramidal dots, clarifying growth processes and delivering site-controlled nanostructures on a par with the best self-assembled ones [e.g. V. Dimastrodonato et al. “Self-limiting profile evolution of seeded two- and three- dimensional nanostructures during metalorganic vapor-phase epitaxy”, PRL 108, 256102 (2012)]. These are now important candidates for quantum technology applications. The work led also to the first demonstration of entangled photon emission optically and electrically pumped from site-controlled dots. Published in Nature Photonics (and featured on the cover), where the scalability of the nanostructure platform is highlighted as candidate for quantum information applications. Numerous Tech/media News sites reported the results and contributed to spreading the relevance of what has become known as “the second quantum revolution”.

2) Dr. Pelucchi established a twin reactor set-up design in Tyndall with the specific purpose of supporting the Irish national effort on III-V devices. A “small” reactor for advanced high purity nanostructures, with unprecedented control on material purity and record material optical properties, and a second 2x3 2 inch wafer set-up dedicate to more applied and industrial applications, which, while necessarily relaxing some “purity” constraints, still delivers the second best material in the world (after the “small” reactor). Over

the years he has become an expert on multiple material systems, ranging from red emitters (>550 nm) to far infrared (~2 micron devices). The 2 micron device material work in collaboration with his IPIC partners has received a strong visibility. His work on III-V modulator material has allowed for record speed demonstrators. He has relevantly impacted other fields, such as temperature insensitive lasing, integrated polarization control and strained epitaxy. He has also become an international **expert in exotic nanostructure applications**, including novel **quantum wires, dashes, dots, rings**, etc.

B. Key Achievements in the Development of Individuals

1) Dr. Pelucchi has been **head of group** since 2007. Since inception the group has been of variable size, ranging from 4 to >10 over the years. The **gender balance** over the years has been of the order of 50%/50%, with small statistical oscillations. While partly a serendipitous result, the 5 maternity leaves have been actively addressed, supporting re-integration after maternity leave and work-life balance as appropriate. Group members have all acquired an excellent publication record and were supported in presenting their result in as many as possible international fora. All PhD defended successful vivas, with what was in general judged by the commission as a rich CV. The majority of former team members have transitioned to a **successful academic career** (~6, e.g. Prof. R. Young (Lancaster University), Prof. M. Manganaro University of Rijeka, Dr. L. Mereni, researcher at LMA (CNRS)), while others have become researchers in the private sector (2) or high school teachers (2).

2) Dr. Pelucchi has been active in **supporting training workshops** (e.g. organized by ITN consortia) and regularly provides **lectures** at such venues on semiconductor epitaxy and quantum optics with quantum dots. He has hosted several undergraduate summer students (>10, a number of which continued their careers as PhD students in associated fields (e.g. nanostructure physics and quantum technologies).

C. Key Achievements Supporting Broader Society & the Economy

1) Dr. Pelucchi is actively engaged in **collaborations with industry**, through a variety of schemes, which include funding secured through EU projects (e.g. ModeGap, Compose3), direct industry collaborations through e.g. SFI cluster (e.g. APPLIED MATERIALS) and SFI centre projects like the IPIC SFI centre of which he is co-Pi (e.g. EBLANA, INTEL, Huawei, Rockley), or through direct contracting and other schemes (INTEL, Rockley, Superlume, Cambridge Chemicals, SAES Getters, Nippon Mining). The industry engagement includes being a member of Photonics 21 industry association, and contributing to the generation of tech-research policy documents (specifically on quantum technology).

2) He is also very active in **Education and Public Engagement**: examples include his research featured in the Boole Documentary sponsored by UCC (2015); he held a “Café Scientifique” at the Royal Soc. Summer Science Exhibition in London summer 2015. His recent works in Nature Photonics have been featured in a number of Tech/media News sites. He is regularly giving general public seminars on quantum technologies, to increase public awareness, demythologizing quantum “strangeness”, highlight the intuitive “field” physics with classical equivalents and so promote STEM interests in new generations.

D. Key Achievements Supporting the Research Community

Dr. Pelucchi is very active in supporting the research community on different fronts.

1) He acts/acted as regular **reviewer for several international publications**, including: Nature Nanotechnology, Nature Communications, Science Advances, Nanoletters, ACS Photonics, Appl. Phys. Lett., APL photonics, Phys. Rev. Lett., Optics Xpress, IEEE Journal of Selected Topics in Quantum Electronics; J. of Appl. Phys., J. of Cryst. Growth, J. of Phys. D and J. of Phys: Cond Mat etc.

-He acts/acted as regular **reviewer** for the following funding agencies: European Research Council (ERC); France: French National Research Agency (ANR); Germany: Deutsche Forschungsgemeinschaft (DFG); Canada: National Science Centre; Poland: National Science Centre; Italy: Anvur.

-He has also acted as external examiner to several PhD vivas over the years.

2) He is active member in conference and meeting organization, equally spread on the “quantum technology” front and the “epitaxial materials and applications” one. These include: organizer of the highly considered international workshop on “Engineering of Quantum Emitter properties”, held yearly. Member of the advisory/program committee for the international conference on the physics of semiconductors (ICPS) and: IPRM joint to CSW, ICMOVPE, EWMOVPE, PHOTONICS IRELAND and ESPS-NIS workshops; Member of the organizing committee of the EW-MOVPE-XI, Lausanne, June 2005 and Photonics Ireland 2009 and 2015.