CURRICULUM VITAE ABREVIADO (CVA) – LUIS LLANES

Part A. PERSONAL INFORMATION

First name	LUIS		
Family name	LLANES		
e-mail	luis.miguel.llanes@upc.edu	URL Web: https://futur.upc.edu/LuisMiguelLlanesPitarch	
Open Researcher and Contributor ID (ORCID)		0000-0003-1054-1073	

A.1. Current position

Position	PROFESSOR (Catedrático de Universidad)		
Institution	UNIVERSITAT POLITÈCNICA DE CATALUNYA		
Department/Center	MATERIALS SCIENCE AND ENGINEERING		EEBE
Country	BARCELONA, SPAIN		
Key words	Mechanical integrity / hard materials/ coatings / reliability / micromechanics / advanced manufacturing ceramics		

A.2. Previous positions (research activity interuptions, indicate total months)

Period	Position/Institution/Country/Interruption cause
1987-1992	RESEARCH FELLOW / UNIV. PENNSYLVANIA (USA)
1992-1997	RESEARCH/TECHNICAL FELLOW / UPC
1997-2003	ASS. PROFESSOR (Titular de Universidad)

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
ENG. BACHELOR DEGREE	UNIVERSIDAD SIMON BOLIVAR (VZLA)	1986
M.Sc. DEGREE	UNIVERSIDAD SIMON BOLIVAR (VZLA)	1990
Ph.D. DEGREE	UNIVERSITY OF PENNSYLVANIA (USA)	1992

Part B. CV SUMMARY *(max. 5000 characters, including spaces)*

As a Research Fellow / PhD student at UPenn, investigation concentrated on cyclic deformation of polycrystalline copper, within Prof. Campbell Laird's group. Attained results provided a basic understanding of the influence of microstructure and crystallographic texture on the cyclic deformation behavior of metals.

At UPC, Director of research group "Structural Integrity, Micromechanics and Reliability of Materials" (CIEFMA), recognized as consolidated unit by the Generalitat de Catalunya (SGR since 1993) as well as Center of Excellence by the European Hard Materials Group (EuroHM) of the European Powder Metallurgy Association (EPMA), and member of TECNIO - platform created by the Generalitat de Catalunya in order to bridge the gap between active research groups at public institutions and the industry. From a management viewpoint, Chairman of the Materials Science and Enginnering Department, from 2012 to 2015; Dean of Barcelona-East School of Engineering, from 2015 to 2018; Steering Committee Member of EuroHM Group since 2011, and currently co-chairing it, since 2019; member of the European Powder Metallurgy Institute (EPMI) since 2017. During 2015-2106 period, responsible for setting and starting new UPC's Diagonal Besòs Campus (CDB) [www.btec.cat/en]: more than 50,000 m^2 of space holding about 4000 people (including teaching, research, administration and service staff, together with students), together with installation and commissioning of more than 100 laboratories, most of them focused on leading research activities in the fields of Materials Science and Engineering, Chemical Engineering, Biomedical Engineering, Energy, Physics, Electronic Engineering and Advanced Manufacturing.

CIEFMA exhibits a wide range of core competences, classified as either consolidated or emerging ones. The former relates to its capability for successful assessment and understanding of mechanical integrity and reliability of CIEFMA-target materials (zirconia-base ceramics, stainless and high-strength steels, ceramic-metal composites - particularly

cemented carbides - and hard coatings) at different length scales. On the other hand, emerging competences rather highlights CIEFMA's potential for implementing Advanced processing – particularly additive manufacturing - towards optimizing microstructural design and/or functionality of specific material systems. Within the above framework, research excellence, internationalization and effective knowledge transfer are transversal pillars, linked through "multidisciplinary" and "intersectorial" approaches, for defining CIEFMA's strategic objectives. Research work is focused on microstructural design optimization of hard materials on the basis of multiscale mechanical integrity assessment. Within this context, investigation concentrates on: (a) influence of microstructure on damage tolerance, residual strength and fatigue sensitivity of hard materials and ceramics; (b) surface integrity effects on performance of coated systems; (c) property tailoring through small-scale testing and micromechanical design of coating/substrate hard systems; and (d) implementation of additive manufacturing routes for development of innovative ceramic and cermet systems. Co-author of more than 200 articles published in specialized journals in above fields. Co-editor of Comprehensive Hard Materials 3-volume series (Elsevier, 2014), Associate Editor of Int J Refract Met Hard Mater (since October 2022), and Editorial Board member of Ceram Int and Metals periodicals. Co-organizer of the last five International Conferences on the Science of Hard Materials (ICSHM). 2022 EPMA Fellow Award, in recognition to academic and research trajectory in the field of Powder Metallurgy.
Supervised 15 PhD Thesis as well as more than 60 MSc and 100 Bachelor Final Thesis/Projects. Last five PhD Thesis supervised are:
- Dr. Daniela Sandoval, "Mechanical properties of cemented carbides at different length scales", Universitat Politècnica de Catalunya (2019)
- Dr. Idriss El Azhari, "Investigations on wear mechanisms for formation of comb cracks in coated tools", Saarland University (Germany) and Universitat Politècnica de Catalunya - DocMASE Program (2020)
- Dr. Yafeng Zheng, "Assessment of corrosion-induced damage in the mechanical contact response of cemented carbides at different length scales", Universitat Politècnica de Catalunya (2020)
- Dr. Hossein Besharatloo, "Micromechanical properties of inorganic multiphase materials", Universitat Politècnica de Catalunya (2021)
- Dr. Maria de Nicolas, "Mechanical integrity of ceramic-metal composite materials: Influence of microstructure and processing route", Universidad Carlos III Madrid (2021)

Part C. RELEVANT MERITS
C.1. Publications
EDITED BOOKS AND GUEST EDITOR IN JOURNALS' SPECIAL ISSUES
- Science of Hard Materials - 7, International Journal of Refractory Metals & Hard Materials 19, 4-6 (2001) 235-568, Guest Eds. L. Llanes, I.C. Grigorescu and V.K. Sarin. Elsevier Science, Oxford (2001) 233 pages
- Science of Hard Materials - 8, International Journal of Refractory Metals & Hard Materials 23, 4-6 (2005) 225-398 and 24, 1-2 (2005) 1-198, Guest Eds. L. Llanes, D. Mari and V.K. Sarin. Elsevier Science, Oxford (2005) 371 pages
- Science of Hard Materials - 9, International Journal of Refractory Metals & Hard Materials 27, 2 (2009) 187-519, Guest Eds. D. Mari, L. Llanes and V.K. Sarin. Elsevier Ltd., Oxford (2009) 333 pages
- Science of Hard Materials - 10, International Journal of Refractory Metals & Hard Materials 49 (2015) 1-406, Special Issue: Selected Papers from the 10th International Conference on the Science of Hard Materials, 10-14 March 2014, Cancún, Mexico. Guest Eds. L. Llanes, D. Mari and V.K. Sarin. Elsevier Ltd., Oxford (2015) 406 pages
- Science of Hard Materials - 11, International Journal of Refractory Metals & Hard Materials (2019/2021), Special Issue: Selected Papers from the 11th International Conference on the Science of Hard Materials, 25-29 March 2019, Khao Lak, Thailand. Guest Eds. D. Mari, E. Jimenéz-Piqué, L. Llanes and V.K. Sarin. Elsevier Ltd., Oxford (https://www.sciencedirect.com/journal/international-journal-of-refractory-metals-and-hard-materials/special-issue/10K8ZQD94QB)
- Comprehensive Hard Materials. Editors: V.K. Sarin (Editor in Chief), D. Mari and L. Llanes (Vol. 1 - Hardmetals and Vol. 2 - Ceramics), Elsevier Ltd. (2014) 1043 pages ISBN: 978-0-08-096528-4

RESEARCH PAPERS

More than 200 publications in peer-reviewed archival journals, from which the following 15, published in the last five years, are highlighted:

- L. Cabezas, C. Berger, E. Jiménez-Piqué, J. Pötschke, L. Llanes, "Testing length-scale considerations in mechanical characterization of WC-Co hardmetal produced via binder jetting 3D printing", Int. J. Refract. Met. Hard Mater. 111 (2023) 106099
- P.V. Sousa Machado, F.C. Caner, L. Llanes, E. Jimenez Pique, A computational framework for micromechanical modelling of WC-Co composites, Int. J. Refract. Met. Hard Mater. 111 106053
- J. Zhang, M. Ahmadi, M. Serra, E. Jimenez-Pique, L. Llanes, G. Fargas, "Integration of conductive silver sensors on zirconia ceramics by screen-printing for monitoring strain under applied load", Ceram. Int. (2022), doi.org/10.1016/j.ceramint.2022.12.005.
- H. Besharatloo, M. de Nicolás-Morillas, M. Chen, A. Mateo, B. Ferrari, E. Gordo, E. Jiménez-Piqué, J.M. Wheeler, L. Llanes, "Micropillar compression of Ti(C,N)-FeNi cermets: Microstructural, processing, and scale effects, J. Eur. Ceram. Soc. (2022), doi.org/10.1016/j.jeurceramsoc.2022.09.029.
- S. Gordon, H. Besharatloo, J.M. Wheeler, T. Rodriguez-Suarez, J.J. Roa, E. Jiménez-Piqué, L. Llanes, "Micromechanical mapping of polycrystalline cubic boron nitride composites by means of high-speed nanoindentation: Assessment of microstructural assemblage effects", J. Eur. Ceram. Soc. (2022), doi.org/10.1016/j.jeurceramsoc.2022.08.047.
- J. Zhang, M. Yarahmadi, L. Cabezas, M. Serra, S. Elizalde, J.M. Cabrera, L. Llanes, G. Fargas, "Robocasting of dense 8Y zirconia parts: Rheology, printing, and mechanical properties", J. Eur. Ceram. Soc. (2022), doi.org/10.1016/j.jeurceramsoc.2022.11.042.
- M. Yarahmadi, J.J. Roa, J. Zhang, L. Cabezas, L. Ortiz-Membrado, L. Llanes, G. Fargas, "Micromechanical properties of Yttria-doped zirconia ceramics manufactured by direct ink writing", J. Eur. Ceram. Soc. (2022), doi.org/10.1016/j.jeurceramsoc.2022.10.067.
- S. Fang, N. Salán, C. Pauly, L. Llanes, F. Mücklich, "Critical assessment of two-dimensional methods for the microstructural characterization of cemented carbides. Metals 12 (2022) 1882.
- Y.F. Zheng, G. Fargas, O. Lavigne, M. Serra, D. Coureaux, P.P. Zhang, Z.H. Yao, Q.L. Zhang, J.H. Yao, L. Llanes, "Contact fatigue of WC-6%wtCo cemented carbides: Influence of corrosion-induced changes on emergence and evolution of damage", Ceram. Int. 48 (2022) 5766-5774.
- F. Álvarez, A. Cifuentes, I. Serrano, L. Franco, G. Fargas, F. Fenollosa, R. Uceda, L. Llanes, C. Tardivat, J. Llorca, J.J. Roa, "Optimization of the sintering thermal treatment and the ceramic ink used in direct ink writing of α-Al_2O_3: Characterization and catalytic application", J. Eur. Ceram. Soc. 42 (2022) 2921-2930
- L. Ortiz-Membrado, N. Cuadrado, D. Casellas, J.J. Roa, L. Llanes, E. Jiménez-Piqué, "Measuring the fracture toughness of single WC grains of cemented carbides by means of microcantilever bending and micropillar splitting", Int. J. Refract. Met. Hard Mater. 108 (2022) 105949
- L. Hodásová, J. Sans, B.G. Molina, C. Alemán, L. Llanes, G. Fargas, E. Armelin, "Polymer infiltrated ceramic networks with biocompatible adhesive and 3D-printed highly porous scaffolds", Addit. Manuf. 39 (2021) 101850
- S. Fang, V. Pérez, N. Salán, D. Bähre, L. Llanes, "Surface patterning of cemented carbides by means of nanosecond laser", Mater. Manuf. Process. 35 (2020) 123-129
- H. Besharatloo, M. de Nicolás, J.M. Wheeler, A. Mateo, B. Ferrari, E. Gordo, L. Llanes, J.J. Roa, "Carbon addition effects on microstructure and small-scale hardness for Ti(C,N)-FeNi cermets", Int. J. Refract. Met. Hard Mater. 85 (2019)105064
- E. Jiménez-Piqué, M. Turon-Vinas, H. Chen, T. Trifonov, J. Fair, E. Tarrés, L. Llanes, "Focused ion beam tomography of WC-Co cemented carbides", Int. J. Refract. Met. Hard Mater. 67 (2017) 9-17.

C.2. Congress

CONFERENCES / INVITED TALKS

Participation in more than 100 International Conferences, including over twenty (20) invited talks. Highlighting the following 3 oral presentations in last 5 years:

"In-Depth Understanding of Fatigue Micromechanisms in Cemented Carbides: Implications for Optimal Microstructural Tailoring", L. Llanes, Keynote Presentation, WORLDPM2018 Congress & Exhibition (China, 2018)

“Understanding Mechanics and Mechanisms involved in Toughening of Cemented Carbides by means of Mechanical Testing at Different Length Scales”, L. Llanes, J.J. Roa and E. Jiménez, Keynote Presentation, 16th International Symposium on Novel and Nano Materials ISNNM-2020 (Korea, 2020)
“Grinding Effects on the Surface Integrity of Hardmetals”, ”, J. Yang, M. Odén, M.P. Johansson-Jõesaar and L. Llanes, Keynote Presentation, PMAI – PM22, International Conference on Powder Metallurgy 2022 (India, 2022)

C.3. Research projects
Participation and leadership in more than 30 international and national research projects, from which the following 5, conducted in the last five years, may be highlighted:
- Implementation of an Innovative Testing Unit for Assessment of Mechanical Response of Advanced Materials at Different Length Scales, Science, Innovation and University Ministry (Spain), EQC2018-004902-P, 2018-2020
- AVINT: Machining stretegies and roughness prediction aiming for an optimal surface integrity, ACCIÓ – RIS3CAT Community – Factories of the Future / Fundació CTM (Coordinator) – Consortium of 10 industrial and R&D centers, COMRDI16-1-0019, 2018-2021
- Ceramic-Metal Composites and W-base Refractory Alloys for Applications under Severe Service Conditions: Microstructural Design and Alternative Processing Routes, Economy and Competitiveness Ministry (Spain) / Instituto de Cerámica y Vidrio, Universidad Carlos III and Universidad Politécnica de Madrid, MAT2015-70780-C4-3-P, 2016-2019
- Field Emission Scanning Electron Microscope (High Resolution): SXES, EBSD, EDS, and in-situ Nanoindentation Unit, Science and Innovation Ministry (Spain), EQC2021-007494-P, 2021-2023
- Fatigue Modelling and Fast Testing Methodologies to Optimize Part Design and to Boost Lightweight Materials Deployment in Chassis Parts, H2020-LC-GV-2020 – 101006844, SC4-Smart, green & integrated transport subprogram (European Union) / CIMNE (Coordinator) and Consortium of 13 industrial and R&D centers, 2021-2024

C.4. Contracts, technological or transfer merits
Track-record of technology transfer and consultancy with International and national industries. Participation and leadership in more than 45 contracts and technology transfer actions with international and national industrial entities or consortiums, from which the following ongoing 5 may be highlighted:
- Simulation of Fatigue Crack Growth of Cemented Carbides - Stages I, II, III, IV and V – SIMUCRACK, EPMA Club Project / Consortium of 9 industrial and R&D centers, 2011-2024
- Mechanical Response of Cemented Carbides at Different Length Scales: A Macro-Micro-Nano Approach for Optimizing Performance and Reliability of Components and Tools, Sandvik Hyperion UK / Hyperion Materials & Technologies Spain, 2016-2023
- Additive Manufacturing of Hardmetals by Non-Laser Processes - AddiHM, EPMA Club Project / Consortium of 11 industrial and R&D centers, 2021-2023
- Assessment of Crack Extension Resistance of Brittle-like Composites by means of Laser-induced Short Cracks, Xiamen Tungsten Co. Ltd. China, 2021-2024
- Hot Deformation Testing of Hardmetals, Sandvik Coromant AB Sweden, 2021-2023

*** Indicators of Quality in Scientific Production**
a) total number of citations, average number of citations during the last five years: 1945
b) total number of publications 234 (1990-2023) / 77 (2018-2023)
c) h-index: 37
d) PhD Thesis supervised: 15
e) six-year research merits (last one: 2012-2017)