



ICPMMT 2020 Keynote Speech

Three-dimensional Slurry Printing Technology In Ceramic and Metal Application

PROFESSOR CHO-PEI JIANG

BACKGROUND



Dr. Jiang is a Professor in the Department of Mechanical Engineering of National Taipei University, Taiwan. He received B.S. from Tatung University in 1997, M.S. from National Central University in 1999 and Ph.D. from National Taiwan University of Science and Technology in 2003. During the career for Industrial Technology Research Institute (ITRI) from 2003 to 2007, his research interest mainly focused on medical device design and novel technology development of additive manufacturing. He collaborated with RIKEN Japan and won the outstanding research

award in 2005, and the excellent paper award in 2006. He became an assistant professor in National Formosa University (NFU) in 2007, Associate Professor and Professor in 2011 and 2015, respectively. He won the NFU outstanding industry-academia achievement collaboration award in 2016 and NFU outstanding research award in 2017. He was a visiting professor in The University of Auckland in 2018. He organized several international conferences and acted as chair for IWMFT 2018, AMBE 2019, AMBE 2017 and AMBE 2015.

QUALIFICATIONS

- Ph.D. Mechanical Engineering (National Taiwan University of Science and Technology, Taiwan – 2003)
- M.S. Mechanical Engineering (National Central University, Taiwan – 1999)
- B.S. Mechanical Engineering (Tatung University, Taiwan –1997)

RELEVANT EMPLOYMENT HISTORY

2018-Present General Secretary, Taiwan Society for Technological of Plasticity (TSTP)

2015-2018 Professor, PME, National Formosa University, Taiwan

2011-2015 Associate Professor, PME, National Formosa University, Taiwan



2007-2011 Assistant Professor, PME, National Formosa University, Taiwan

2003-2007 Researcher, Biomedical Research Center, ITRI, Taiwan

RESEARCH INTERESTS

Prof. Jiang has authored over 50 original papers, 10 patents/applications. His research interests are in the areas of additive manufacturing, digital manufacturing in dental application, metal forming and biofabrication. His research and development works combine numerical modeling, analysis, system development and experimental measurement in understanding deformation behavior in metallic engineered material such as titanium alloy and Inconel 718, crystallization structure in ceramic such as zirconia oxide, and biomechanical property in synthesized biopolymer such as bone scaffold, artificial jaw bone and teeth. Theoretical topics of his current and past researches include plasticity, solid mechanics, biomechanics, finite element analysis, optimization design, thermal management, mechatronic integration and designs.

AWARD

2017 NFU Outstanding Research Award

2016 NFU Outstanding Industry-Academia Collaboration Achievement Award

MAJOR RESEARCH PAPERS (WITHIN 5 YEARS):

1. H.-J. Hsu, S.-Y. Lee, **C.-P. Jiang*** and R. Lin, "A comparison of the marginal fit and mechanical properties of a zirconia dental crown using CAM and 3DSP," *Rapid Prototyping Journal*, Vol. 25, pp. 1187-1197, 2019. (SCI)
2. J. Dong, R.-J. Jhu, L. Wang, **C.-P. Jiang*** & C. J. Xian, "A hybrid platform for three-dimensional printing of bone scaffold by combining thermal-extrusion and electrospinning methods," *Microsystem Technologies*, DOI 10.1007/s00542-019-04338-x, 2019. (SCI)
3. J. Dong, Y.-D. Yang, L. Wang, **Cho-Pei Jiang***, "Fabrication of three-dimensional mPEG-PCL-mPEG scaffolds combined with cell-laden gelatin methacrylate (GelMA) hydrogels using thermal extrusion coupled with photo curable technique," *Microsystem Technologies*, Vol. 25, pp. 3339-3355, 2019. (SCI)
4. Y.-C. Cheng*, **C.-P. Jiang** and D.-H. Lin, "Finite element based optimization design for a one-piece zirconia ceramic dental implant under dynamic loading and fatigue life validation," *Structural and Multidisciplinary Optimization*, Vol. 59, pp. 835-849, 2019. (SCI)
5. W.-T. Chang, H.-J Hsu, **C.-P. Jiang**, S.-Y. Lee and Y.-M. Lin, "Effects of titanium dioxide and tartrazine lake on Z-axis resolution and physical properties of resins printed by visible-light 3D printers," *Rapid Prototyping Journal*, Vol. 24, pp. 160-165, 2018. (SCI)
6. T.-H. Huang, **C.-P. Jiang***, and F. V. Grechnikov, "Effect of Grain Size on Mechanical Revolution of Pure Titanium and Die Cavity Filling Rate in Hot Squeezing Mini Spur-Gear Forming Process," *International Journal of Precision Engineering and Manufacturing*, Vol. 18, pp. 1371-1377, 2017. (SCI)



7. Y.-C. Cheng, D.-H. Lin, **C.-P. Jiang*** and Y.-M. Lin, “Dental implant customization using numerical optimization design and 3-dimensional printing fabrication of zirconia ceramic,” *International Journal for Numerical Methods in Biomedical Engineering*, 33(5), DOI: 10.1002/cnm.2820, 2017. (SCI)
8. Y.-H. Hsieh, M.-F. Hsieh*, C.-H. Fang, **C.-P. Jiang**, B. Lin and H.-M. Lee, “Osteochondral Regeneration Induced by TGF- β Loaded Photo Cross-Linked Hyaluronic Acid Hydrogel Infiltrated in Fused Deposition-Manufactured Composite Scaffold of Hydroxyapatite and Poly (Ethylene Glycol)-Block-Poly(ϵ -Caprolactone),” *Polymer*, Vol. 9, pii: E182. doi: 10.3390/polym9050182., 2017. (SCI)
9. S.-Y. Lee and **C.-P. Jiang***, “Development of a three-dimensional slurry printing system using dynamic mask projection for fabricating zirconia dental implants,” *Materials and Manufacturing Processes*, Vol. 30, pp.1498-1504, 2015. (SCI)
10. **Cho-Pei Jiang***, “The effect of Initial Grain Size on the Mechanical Properties and Deformability of Titanium alloy in a Direct Extrusion Process,” *International Journal of Precision Engineering and Manufacturing*, Vol. 16, pp. 301-307, 2015. (SCI)
11. Y.-C. Cheng, D.-H. Lin, **C.-P. Jiang*** and S.-Y. Lee, “Design improvement and dynamic finite element analysis of novel ITI dental implant under dynamic chewing loads,” *Bio-Medical Materials and Engineering*, Vol. 26, pp. S555-561, 2015. (SCI)
12. **C.-P. Jiang***, Y.-C. Cheng, W.-L. Tsai and C.-K. Lee, “Uniform design and dynamic finite element analysis for micromotion improvement of semados dental implant system with dynamic chewing loads,” *Journal of Mechanics in Medicine and Biology*, Vol. 14, 1440007, 2014. (SCI)
13. **Cho-Pei Jiang***, “Initial grain size effect on mechanical properties and springback behavior of thin metal sheets with varying rolling reduction ratios,” *International Journal of Precision Engineering and Manufacturing*, Vol. 15, pp. 291-297, 2014. (SCI)
14. **C.-P. Jiang***, H.-J. Hsu and S.-Y. Lee, “Development of mask-less projection slurry stereolithography for the fabrication of zirconia dental coping,” *International Journal of Precision Engineering and Manufacturing*, Vol. 15, pp. 2413-2419, 2014. (SCI)
15. **C.-P. Jiang*** and Y.-Y. Chen, “Biofabrication of hybrid bone scaffolds using a dual-nozzle bioplotter and in-Vitro study of osteoblast cell,” *International Journal of Precision Engineering and Manufacturing*, Vol. 15, pp. 1947-1953, 2014. (SCI)
16. H.-T. Liao, Y.-Y. Chen, Y.-T. Lai, M.-F. Hsieh and **C.-P. Jiang***, “The Osteogenesis of Bone Marrow Stem Cells on mPEG-PCL-mPEG/Hydroxyapatite Composite Scaffold via Solid Freeform Fabrication,” *BioMed Research International*, vol. 2014, Article ID 321549, 13 pages, 2014. doi:10.1155/2014/321549. (SCI)
17. I.-C. Chou, S.-Y. Lee and **C.-P. Jiang***, “Effects of implant neck design on primary stability and overload in a type IV mandibular bone,” *International Journal for Numerical Methods in Biomedical Engineering*, Vol. 30, pp. 1223-1237, 2014. (SCI)
18. Y.-M. Huang, I.-C. Chou, **C.-P. Jiang**, Y.-S. Wu and S.-Y. Lee, “Finite element analysis of dental implant neck effects on primary stability and osseointegration in a type IV bone mandible,” *Bio-Medical Materials and Engineering*, Vol. 24, pp.1407 – 1415, 2014. (SCI)



19. I.-C. Chou, S.-Y. Lee, M.-C. Wu, C.-W. Sun and **C.-P. Jiang***, "Finite element modeling of implant designs and cortical bone thickness on stress distribution in maxillary type IV bone," *Computer Methods in Biomechanics and Biomedical Engineering*, Vol. 17, pp. 516-526, 2014. (SCI)