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Engineering & Scientific Consulting

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Professional Profile

Dr. Mostaed specializes in failure analysis of metallic materials with specific expertise in metallurgy, microstructure design, corrosion, metal deformation/recrystallization, rapid solidification, and additive manufacturing. Dr. Mostaed has extensive experience in development of high-performance metal alloys for extreme conditions such as corrosive environments, overload, fatigue, and high temperature exposure.

Dr. Mostaed is skilled using a wide array of analytical tools and techniques, including metallography, optical and electron microscopy, electron backscatter diffraction (EBSD), X-ray diffraction (XRD), differential thermal analysis, and mechanical testing under static and cyclic loading. His deep understanding of process-structure-property relationships enables him to identify the root cause of failure in materials and devices.

Prior to joining Exponent, Dr. Mostaed was a materials scientist at Uniformity labs, Inc. where he managed the binder jetting Shop and P1 machines and developed new technology for new materials. Specifically, his responsibilities included development of powder spreading and print strategies in metal binder jet 3D printing to improve bed uniformity, print fidelity, part surface quality, and strength. In addition, Dr. Mostaed worked on sintering process adjustment and design optimization to enhance densification and eliminate sintering-induced distortion of the printed parts.

Dr. Mostaed completed his PhD at Polytechnic University of Milan, where he focused on adopting severe plastic deformation strategies for development of ultrafine-grained (UFG) Mg-based alloys for bioabsorbable bone implant applications. He found that UFG Mg alloys exhibit unprecedented mechanical properties, corrosion behavior, and superplastic ductility. Accordingly, he extensively studied the effects of microstructural features including grain size, crystallographic texture, deformation twinning, and secondary phases on mechanical strength, ductility, tension-compression yield asymmetry, and deformation mechanism in UFG Mg alloys. Additionally, Dr. Mostaed formulated and processed high strength, creep resistant, and biocompatible Zn alloys for biodegradable vascular stenting applications. He discovered a superplastic to high-strength behavior transition via microstructure design in Zn-based alloys.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, Polytechnic University of Milan, 2016

M.S., Materials Science and Engineering, Iran University of Science and Technology, 2009

B.S., Materials Science and Engineering, Shahid Chamran University of Ahvaz, Iran, 2006

Prior Experience

Materials Scientist, Uniformity labs, 2020–2022

Postdoctoral Researcher, Michigan University of Technology, 2017-2020

Postdoctoral Researcher, Polytechnic University of Milan, 2016-2017

Patents

U.S. Patent Number 0047781 A1: Bioresorbable endoluminal prosthesis for medium and large vessels, February 2022 (Bocks M, Drelich J.W, Goldman J, Mostaed E).

Publications

Slone C, Mostaed E, Cline C, Kaplowitz D ,Ganot G, James B, Aguiar D. Copper Contamination Cracking in a Pipeline Repair Weld. Journal of Failure Analysis and Prevention, February 2024.

Guillory II R.J, Mostaed E, Oliver, A.A, Morath L.M, Earley E.J, Flom K. L, Kolesar T.M, Mostaed A, Summers H.D, Kwesiga M.P, Drelich J.W, Carlson K.D, Dragomir-Daescu D, Goldman J. Improved biocompatibility of Zn–Ag-based stent materials by microstructure refinement. Acta Biomaterialia 2022; 145:416-426.

Oliver A.A, Guillory R.J, Flom K.L, Morath L.M, Kolesar T.M, Mostaed E, Sikora-Jasinska M, Drelich J.W, Goldman J. Analysis of vascular inflammation against bioresorbable Zn–Ag-based alloys. ACS Applied Bio Materials 2020; 3: 6779-6789.

Mostaed E, Sikora-Jasinska M, Wang L, Mostaed A, Reaney I.M, Drelich J.W. Tailoring the mechanical and degradation performance of Mg-2.0Zn-0.5Ca-0.4Mn alloy through microstructure design. JOM 2020; 72:1880-1891.

Sikora-Jasinska M, Mostaed E, Goldman, J, Drelich J.W. Albumins inhibit the corrosion of absorbable Zn alloys at initial stages of degradation. Surface Innovations 2020; 8:234-249.

Ardakani M.S, Mostaed E, Sikora-Jasinska M, Kampe S.L, Drelich J.W. The effects of alloying with Cu and Mn and thermal treatments on the mechanical instability of Zn-0.05 Mg alloy. Materials Science and Engineering: A 2020; 770:138529.

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Hao M, Cheng W, Wang L, Mostaed E, Bian L, Wang H, Niu X. Texture evolution in Mg-8Sn-1Zn-1Al alloy during hot compression via competition between twinning and dynamic precipitation. Materials Science and Engineering: A 2019; 748:418-427.

Sikora-Jasinska M, Chevallier P, Turgeon S, Paternoster C, Mostaed E, Vedani M, Mantovani D. Understanding the effect of the reinforcement addition on corrosion behavior of Fe/Mg2Si composites for biodegradable implant applications. Materials Chemistry and Physics 2019; 223:771-778

Mostaed E, Ardakani M, Sikora-Jasinska M, Drelich J.W. Precipitation induced room temperature superplasticity in Zn-Cu alloys. Materials letters 2019; 244:203-206.

Champagne S, Mostaed, E Safizadeh F, Ghali E, Vedani M, Hermawan H. In vitro degradation of absorbable zinc alloys in artificial urine. Materials 2019; 12:295

Mostaed E, Sikora-Jasinska M, Drelich J.W. Vedani, M. Zinc-based alloys for degradable vascular stent applications. Acta Biomaterialia 2018; 71:1-23.

Sikora-Jasinska M, Chevallier P, Turgeon S, Paternoster C, Mostaed E, Vedani M, Mantovani D. Long-term in vitro degradation behaviour of Fe and Fe/Mg 2 Si composites for biodegradable implant applications. RSC advances 2018; 8:9627-9639.

Wang L, Cao M, Cheng W, Zhang H, Cao X, Mostaed E. Improved stretch formability of AZ31 magnesium thin sheet by induced {10–12} tension twins. JOM 2018; 70:2321-2326.

Palumbo G, Sorgente D, Vedani M, Mostaed E, Hamidi M, Gastaldi D, Villa T. Effects of superplastic forming on modification of surface properties of Ti alloys for biomedical applications. Journal of Manufacturing Science and Engineering 2018; 140:091012.

Sikora-Jasinska M, Paternoster C, Mostaed E, Tolouei R, Casati R, Vedani M, Mantovani D. Synthesis, mechanical properties and corrosion behavior of powder metallurgy processed Fe/Mg2Si composites for biodegradable implant applications. Materials Science and Engineering: C 2017; 81:511-521.

Sikora-Jasinska M, Mostaed E, Mostaed A, Beanland R, Mantovani D, Vedani M. Fabrication, mechanical properties and in vitro degradation behavior of newly developed ZnAg alloys for degradable implant applications. Materials Science and Engineering: C 2017; 77:1170-1181.

Montani M, Gökhan Demir A, Mostaed E, Vedani M, Previtali B. Processability of pure Zn and pure Fe by SLM for biodegradable metallic implant manufacturing. Rapid Prototyping Journal. 2017; 23:514-523.

Zarini S, Mostaed E, Vedani M, Previtali B. Formability enhancement of Al 6060 sheets through fiber laser heat treatment. International Journal of Material Forming 2017; 10:741-751.

Mostaed E, Sikora-Jasinska M, Mostaed A, Loffredo S, Gokhan Demir A, Previtali B, Mantovani D, Beanland R, Vedani M. Novel Zn-based alloys for biodegradable stent applications: design, development and in vitro degradation. Journal of the mechanical behavior of biomedical materials 2016; 60:581-602.

Wang L, Zhang H, Huang G, Cao M, Cao X, Mostaed E, Vedani M. Formability and anisotropy of the mechanical properties in commercially pure titanium after various routes normal and different speed rolling. Journal of Materials Research 2016; 31:3372-3380.

Wang L, Mostaed E, Cao X, Huang G, Fabrizi A, Bonollo F, Chi C, Vedani M. Effects of texture and grain size on mechanical properties of AZ80 magnesium alloys at lower temperatures. Materials & Design 2016; 89:1-8.

Mostaed E, Fabrizi A, Dellasega D, Bonollo F, Vedani M. Grain size and texture dependence on mechanical properties, asymmetric behavior and low temperature superplasticity of ZK60 Mg alloy. Materials Characterization 2015; 107:70-78.

Wang L, Huang G, Han T, Mostaed T, Pan F, Vedani M. Effect of twinning and detwinning on the spring-back and shift of neutral layer in AZ31 magnesium alloy sheets during V-bend. Materials & Design 2015; 68:80-87.

Mostaed E, Fabrizi A, Dellasega D, Bonollo F, Vedani M. Microstructure, mechanical behavior and low temperature superplasticity of ECAP processed ZM21 Mg alloy. Journal of Alloys and Compounds 2015; 638:267-276.

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Mostaed E, Hashempour M, Dellasega D, Fabrizi A, Bestetti M, Bonollo F, Vedani M. Microstructure, texture evolution, mechanical properties and corrosion behavior of ECAP processed ZK60 magnesium alloy for biodegradable applications. Journal of the Mechanical Behavior of Biomedical Materials. 2014; 37:307-322.

Wang L, Huang G, Quan Q, Bassani P, Mostaed E, Vedani M, Pan F. The effect of twinning and detwinning on the mechanical property of AZ31 extruded magnesium alloy during strain-path changes. Materials & Design 2014; 63:177-184.

Mostaed E, Vedani M, Hashempour M, Bestetti M. Influence of ECAP process on mechanical and corrosion properties of pure Mg and ZK60 magnesium alloy for biodegradable stent applications. Biomatter 2014; 4:e28283.

Mostaed A, Saghafian H, Mostaed E, Shokuhfar A, Rezaie HR. Effect of reinforcing particle type on morphology and age-hardening behavior of Al–4.5 wt.% Cu based nanocomposites synthesized through mechanical milling. Materials characterization 2013; 76:76-82.

Mostaed E, Saghafian H, Mostaed A, Shokuhfar A, Rezaie H.R. Investigation on preparation of Al–4.5% Cu/SiCp nanocomposite powder via mechanical milling. Powder technology 2012; 221:278-283.

Presentations

Mostaed E, Sikora-Jasinska M, Drelich J.W. High Strength Rare Earth Free Mg Alloys with Controlled Degradation Behavior Through Microstructural Manipulation. TMS 149th Annual Meeting & Exhibition, Biodegradable Materials for Medical Applications II, San Diego, CA, February 23-27, 2020.

Mostaed E, Sikora-Jasinska M, Drelich J.W. Multidimensional analysis on bioabsorbable Zn-Ag-based alloys for stent applications. Materials Science & Technology (MS&T), Portland, OR, September 29-October 3, 2019.

Mostaed E, Drelich J.W. Progress on bioabsorbable Zn alloys for vascular stent applications, TMS 147th Annual Meeting & Exhibition, Phoenix, AZ, March 11-15, 2018.

Mostaed E, Sikora-Jasinska M, Ramirez A, Levesque L, Mantovani D, Vedani M. Development of Zn-based alloys for future bioabsorbable vascular stents. 9th Symposium on Biodegradable Metals, Bertinoro, Italy, August 27-September 1, 2017.

Mostaed E, Sikora-Jasinska M, Ramirez A, Biffi C, Tuissi A, Mantovani D, Vedani M. Zn-Ag alloy wires for future absorbable surgical sutures. 9th Symposium on Biodegradable Metals, Bertinoro, Italy, August 27-September 1, 2017.

Mostaed E, Sikora-Jasinska M, Mostaed A, Loffredo S, Mantovani D, Beanland R, Vedani M. Zn-based biodegradable alloys: recent achievements and novel alloy development. 10th World Biomaterials Congress, Montreal, Canada, May 17-22, 2016.

Mostaed E, Sikora-Jasinska M, Tuissi, A, Mantovani, D, Vedani M. Processing of Zn based alloy tubes for biodegradable stent applications. EURO BioMAT Weimar, Germany, April 21-22 2015.

Mostaed E, Hashempour M, Dellasega D, Fabrizi A, Bonollo F, Bestetti M, Vedani M. Properties of ultrafine-grained structure Mg alloys. 6th Symposium on Biodegradable Metals Maratea, Italy, August 24-29, 2014.

Mostaed E, Ge Q, Vedani M, Oliveira Botelho P.A, Zanella C, Deflorian F. Mechanical properties and corrosion behavior of ECAP processed Mg alloys. International symposium on metastable, amorphous and nanostructured materials, Turin, Italy June 30- July 5, 2013.

Peer Reviews

Acta Biomaterialia

Materials Science & Engineering A

Materials Science & Engineering C

Journal of alloys and compound

Journal of Magnesium and Alloys

Materials Characterizations

Surface Innovations

JOM