Curriculum Vitae

Personal Information

FIRST NAME: Emre
SURNAME: Cinkilic
GENDER (M/F): [redacted]
COUNTRY OF RESIDENCE: [redacted]
EMAIL: [redacted]
PHONE: [redacted]

Current position

- Oct 2021 – Present Assistant Prof. of Materials Science and Engineering, Hakkari University
    - I am currently an Assistant Professor at the Department of Materials Science and Engineering at Hakkari University

- May 2022 – Present Founder, CyberAlloys Technology and R&D Ltd.

    - Using the Integrated Computational Materials Engineering framework, we provide cost-effective, value-added, and tailored solutions to material problems.
        - Intelligent design of new materials and processes to reduce development time and cost.
        - Rapid optimization of processing conditions to meet user-defined performance objectives. (e.g. working with aluminum die casters and wheel producers on improving the cleanliness of melt to reduce casting defects in HPDC and LPDC casting parts)

Education

- 2013-2019 Doctor of Philosophy, Materials Science and Engineering, The Ohio State University, Columbus, OH, U.S.A.

Funded by
the European Union

- 2013-2016 Master's Degree, Materials Science and Engineering, The Ohio State University, Columbus, OH, U.S.A.
- 2011-2013 Master's Degree, Electrical and Computer Engineering, The Ohio State University, Columbus, OH, U.S.A.
- 2004-2009 Bachelor of Science, Metallurgical and Materials Engineering, The Ohio State University, Columbus, OH, U.S.A.

Research and Work Experience

- 2019-2021 Post-Doctoral Researcher, The Ohio State University, Columbus, OH, U.S.A.
    - Developed a sustainable recycled aluminum alloy and procedures to improve the secondary alloy melt quality, which resulted in an international patent application and the subsequent licensing of the technology to a US-based secondary alloy producer. Link to the patent application: patents.google.com/patent/US20220098706A1/en
    - Patented recycled alloy with high Fe-content produced from actual aluminum scrapvachieved over 9% elongation in T6 condition. Link to publication: link.springer.com/article/10.1007/s11661-022-06711-4
    - Investigated the high-temp. corrosion resistance and insulation properties of commercial refractories used in Al melting and holding furnaces using CALPHAD approach and target experiments. A family of refractories that can reduce heat loss by 20% while minimizing high-temp corrosion was identified. The results of the study, generated in collaboration with Ryobi, were presented at NADCA 2020 Congress and won the Best Paper Award. Link to the proceeding: mse.osu.edu/sites/default/files/2020-12/NADCA%20T20-032%20Refractory%20modeling.pdf.
    - Investigated pathways to produce sustainable Al-Ce-Fe alloys using rare-earth mining by-product misch metal for high-temp. applications. Produced alloys showed excellent property retention after being subjected to 500°C for an extended period.
    - Led the design of a water analogue test set up to mimic HPDC process to study the fluid flow in die cavity and correlate it with casting simulation software results. Research was conducted in collaboration with Ford and results were used to analyze and optimize the flow patterns in HPDC castings for improved casting quality and process efficiency.

- 2017 Co-Op at Technical Research Center, Alcoa, New Kensington, PA, U.S.A.
    - Developed a modeling tool for precipitation of strengthening phases and mechanical properties of die cast aluminum alloys.
    - Model was able to predict final mechanical properties with 90% accuracy for Al-Si-Mg-Fe-Mn die casting alloys.

- 2013-2019 Graduate Research Fellow, The Ohio State University, Columbus, OH, U.S.A.
    - Investigated the cooling rate dependent Fe-to-Mn ratios for sustainable Al-Si-Mg based die casting alloys with high Fe content. The project was funded by the National Science Foundation (NSF) and conducted in collaboration with ALCOA. The findings from the project were instrumental in securing over $1 million in funding from REMADE Institute to advance our understanding of secondary aluminum castings for structural applications.
    - Created a map of Fe-to-Mn ratio vs. cooling rate, for the first time, to summarize the metallurgical conditions of Fe-containing intermetallic phase formation in recycled aluminum die casting alloys with high Fe content (0.5 to 1 wt.%) for cooling rates covering major industrial casting processes.
    - Made significant contributions to the development of a simulation tool that predicts location-specific grain size and porosity in high-pressure die cast (HPDC) aluminum alloys. The simulation tool utilized a hybrid approach, combining cellular automaton (CA), CALPHAD, and process modeling techniques.
    - Studied the impact of the vacuum level within the die cavity on the formation of porosity in structural aluminum castings. This research aimed to improve the casting quality and reduce porosity defects by optimizing the vacuum conditions during the HPDC process.

- 2011-2013 Graduate Research Fellow, The Ohio State University, Columbus, OH, U.S.A
    - Investigated the effect of atomic layer deposition (ALD) conditions on the density of interface traps at the high–k dielectric/III–V and high–k dielectric/III–Nitride interfaces by Constant Capacitance DLTS and Constant Capacitance DLOS to assess accuracy of rapid characterization techniques.
    - Characterized proton-irradiation damage in n-type GaN semiconductors used in high-electron mobility transistors designed for space applications.

Research Activity and Interests

Metallurgical engineer with expertise in alloy design and process modeling using the Integrated Computational Materials Engineering (ICME) framework. Demonstrated success in the design of novel secondary cast aluminum alloys for automotive structural applications (A. Luo, E. Cinkilic, M. Moodispaw - US Patent 119329023, 2024) employing vacuum high-pressure die casting. Developed a collaborative computer algorithm with Alcoa to accurately predict heat treatment schedules for structural Al-Si-Mg-Mn die casting alloys. Skilled in utilizing computational materials design tools and conducting target experiments for rapid deployment of novel alloys and optimized manufacturing processes. Current focus is on the multi-faceted analysis of alloy composition and process parameters on final material properties for casting and extrusion aluminum alloys using a combined CALPHAD and machine learning approach.

Relevant Publications

Google Scholar Info:
https://scholar.google.com/citations?user=9MZ9oEsAAAAJ&hl=en

- Cinkilic, E., Moodispaw, M., Zhang, J., Miao, J., & Luo, A. A. (2022). A New Recycled Al–Si–Mg Alloy for Sustainable Structural Die Casting Applications. Metallurgical and Materials Transactions A, 53(8), 2861–2873. https://doi.org/10.1007/s11661-022-06711-4
- Cinkilic, E., Ridgeway, C. D., Yan, X., & Luo, A. A. (2019). A Formation Map of Iron-Containing Intermetallic Phases in Recycled Cast Aluminum Alloys. Metallurgical and Materials Transactions A, 50(12), 5945–5956. https://doi.org/10.1007/s11661-019-05469-6
- Cinkilic, E., Yan, X., & Luo, A. A. (2020). Modeling Precipitation Hardening and Yield Strength in Cast Al-Si-Mg-Mn Alloys. Metals, 10(10), 1356. https://doi.org/10.3390/met10101356
- Emre Cinkilic Andrew D. Klarner, Alan A. Luo, W. S. (2015). Use of CALPHAD Modelin in Controlling the Microstructure of Cast Aluminum Alloys. In 119th Metalcasting Congress. American Foundry Society.
- Gu, C., Lu, Y., Cinkilic, E., Miao, J., Klarner, A., Yan, X., & Luo, A. A. (2019). Predicting grain structure in high pressure die casting of aluminum alloys: A coupled cellular automaton and process model. Computational Materials Science, 161, 64–75. https://doi.org/10.1016/j.commatsci.2019.01.029
- Gu, C., Lu, Y., Ridgeway, C. D., Cinkilic, E., & Luo, A. A. (2019). Three-dimensional cellular automaton simulation of coupled hydrogen porosity and microstructure

during solidification of ternary aluminum alloys. Scientific Reports, 9(1), 13099. https://doi.org/10.1038/s41598-019-49531-0

- Gu, C., Ridgeway, C. D., Cinkilic, E., Lu, Y., & Luo, A. A. (2020). Predicting gas and shrinkage porosity in solidification microstructure: A coupled three-dimensional cellular automaton model. Journal of Materials Science & Technology, 49, 91–105. https://doi.org/10.1016/j.jmst.2020.02.028
- Miao, J., Zhang, C., Klarner, A. D., Zhang, J., Cinkilic, E., Zhang, F., & Luo, A. A. (2022). Characterization and modeling of concurrent precipitation in Mg-Al-Sn alloys using an improved Kampmann-Wagner numerical (KWN) model. Materialia, 21, 101348. https://doi.org/10.1016/j.mtla.2022.101348
- Sun, W., Shi, X., Cinkilic, E., & Luo, A. A. (2016). Investigation of the non-equilibrium solidification microstructure of a Mg–4Al–2RE (AE42) alloy. Journal of Materials Science, 51(13), 6287–6294. https://doi.org/10.1007/s10853-016-9925-4ublications here

Relevant grants and awards

- 2024-2026 Sustainable UniAlloy Design and HPDC Process Optimization by ICME Framework (Total of $250.000 grant by Scientific and Technological Research Council of Türkiye and Industry partner)