
Andy Thawko

Assistant Professor
Faculty of Mechanical Engineering
Technion- Israel Institute of Technology

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[Google Scholar](#)

ACADEMIC DEGREES

Technion- Israel Institute of Technology Haifa, IL
Ph.D., GTEP Energy Program December 2021
Supervisor: Prof. Leonid Tartakovsky
Thesis: The mechanism of particle formation in non-premixed hydrogen combustion in a direct-injection internal combustion engine

Technion- Israel Institute of Technology Haifa, IL
M.E., Energy Engineering August 2013
GTEP Energy Program

Technion- Israel Institute of Technology Haifa, IL
B.Sc., Mechanical Engineering September 2009

ACADEMIC APPOINTMENTS

Technion- Israel Institute of Technology Faculty of Mechanical Engineering
Assistant Professor August 2024 –present
Reacting Flows and Sustainable Energy Technologies Laboratory

Princeton University Department of Mechanical and Aerospace Engineering
Postdoctoral Research Fellow 2022 –2024
Advisor: Prof. Yiguang Ju
Combustion and Low Carbon Energy Conversion laboratory

PROFESSIONAL EXPERIENCE

IDF- Israel Defense Forces Test & Evaluation Unit
Automotive Research and Testing Team Leader, Captain 2015 – 2017
Leading the group that is responsible for vehicle R&D and testing in the IDF.

IDF- Israel Defense Forces Automotive Engineering Division
Project Manager, Captain 2011 – 2015
Leading projects from planning to delivery; including statement of work (SOW) development, and integrated logistic support (ILS) package execution.

IDF- Israel Defense Forces Automotive Engineering Division
R&D Engineer, Lieutenant 2009 – 2011
Research, development, and maintenance of tactical ground-vehicle automotive components

RESEARCH INTERESTS

- Low temperature combustion
- Propulsion
- Alternative fuels
- Plasma assisted manufacturing
- Detonation
- Kinetic enhancement of reacting flows
- Waste heat recovery
- Chemical looping
- Pollution mitigation
- Polygeneration systems

TEACHING EXPERIENCE**Technion – Israel Institute of Technology**

Faculty of Mechanical Engineering

Teaching Assistant

2017 – 2022

Thermodynamics-1, 034035 (Lead TA); Thermodynamics-2, 034091; Heat Transfer, 034041; Creative Overview of Mechanical Engineering, 035026; Electric Actuators, 034034.

Technion – Israel Institute of Technology

International School

Teaching Assistant

2017 – 2021

Thermodynamics-1, 034035; Electric Actuators, 034034.

PUBLIC PROFESSIONAL ACTIVITIES**Editorial Board**

Review Editor

2021 – Present

Frontiers in Aerospace Engineering Journal, specialty section in Energetics and Propulsion

Reviewing Activities

- The National Science Center, Poland
- Proceeding of the Combustion Institute
- SAE International Journal of Engines
- International Journal of Chemical Engineering
- Fuel
- Combustion Science and Technology
- SAE Technical Papers

MEMBERSHIP IN PROFESSIONAL SOCIETIES

- SAE International - The Society of Automotive Engineers
- The Combustion Institute

FELLOWSHIPS, AWARDS AND HONORS

- The Israel Council for Higher Education, Planning and Budgeting Committee – Postdoctoral fellowship for academic excellence, 2022-2023.
- Vivian Konigsberg Award for Excellence in Teaching, Technion, 2020, 2022.
- The Israel Council for Higher Education, Planning and Budgeting Committee – Ph.D. Scholarship for academic excellence, 2018-2021.
- Best Poster Award 2nd prize, SAE Waste Heat Recovery Symposium, 2018.
- Best Poster Award 3rd prize, the 7th Conference on UAV Propulsion Technologies, 2018.
- President's Excellence List, Technion- Faculty of Mechanical Engineering, 2009.
- Dean's Excellence List, Technion - Faculty of Mechanical Engineering, 2008.

PUBLICATIONS**Refereed papers in professional journals**

- J1) Poran A., **Thawko A.**, Eyal A., Tartakovsky L., Direct injection internal combustion engine with high-pressure thermochemical recuperation—Experimental study of the first prototype. *International Journal of Hydrogen Energy*, 43(27): 11969-80, 2018.
- J2) **Thawko A.**, Tartakovsky L., RANS simulation of a multicomponent underexpanded gaseous jet mixing - effects of composition and injection condition. *SAE Technical Paper*, 2019-32-0515, 2019.
- J3) **Thawko A.**, Yadav H., Eyal A., Shapiro M., Tartakovsky L., Particle emissions of direct injection internal combustion engine fed with a hydrogen-rich reformat. *International Journal of Hydrogen Energy*, 44(52): 28342-56, 2019.
- J4) **Thawko A.**, Yadav H., Shapiro M., Tartakovsky L., Effect of lubricant oil formulation on characteristics of particle emission from engine fed with a hydrogen-rich fuel. *SAE Technical Paper*, 2020-01-2200, 2020.

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- J5) **Thawko A.**, Persy S.A, Eyal A., Tartakovsky L., Effects of fuel injection method on energy efficiency and combustion characteristics of SI engine fed with a hydrogen-rich reformat. *SAE Technical Paper*, 2020-01-2082, 2020.
- J6) **Thawko A.**, Yadav H., Van Hout R., Tartakovsky L., Flow field characteristics of a confined, underexpanded transient round jet. *Physics of Fluids*, 33(8): 085104, 2021.
- J7) Eyal A.*, **Thawko A.***, Baibikov V., Tartakovsky L., Performance and pollutant emission of the reforming-controlled compression ignition engine – experimental study. *Energy Conversion and Management*, 237: 114126, 2021. (***Equal contribution**)
- J8) **Thawko A.**, Eyal A., Tartakovsky L. Experimental comparison of performance and emissions of a direct-injection engine fed with alternative gaseous fuels. *Energy Conversion and Management*, 251: 114988, 2022.
- J9) **Thawko A.**, Tartakovsky L., The mechanism of particle formation in non-premixed hydrogen combustion in a direct-injection internal combustion engine. *Fuel*, 327:125187, 2022.
- J10) Wang Z.*, **Thawko A.***, Mei B., Wenbin X., Law C., Ju Y., Pressure effects on reactivity and extinction of n-dodecane diffusion cool flame. *Combustion and Flame*, 254:112829, 2023. (***Equal contribution**)
- J11) **Thawko A.**, Wang Z., Liu N., Ju Y., Observation of two different cool flame regimes of diethyl ether in a counterflow burner. *Fuel*, 346:128269, 2023.
- J12) Zhong H., Meng Q., Mei B., **Thawko A.**, Yan C., Liu N., Mao X., Wang Z., Wysocki G., Truhlar D., Ju Y., Direct kinetic measurements and theoretical predictions of singlet oxygen atom reaction with dimethyl ether. *The Journal of Physical Chemistry Letters*, 15:6158-6165, 2024.
- J13) Wang Z., Mei B., Liu N., **Thawko A.**, Mao X., Glarborg P., Klippenstein S., Ju Y., Study of high pressure ammonia/methanol oxidation up to 100 atm. *Proceedings of the Combustion Institute*. (**accepted**)
- J14) **Thawko A.**, Yuanxin C., Shi Z., Vorenkamp M., Wang Z., Mei B., Mao X., Ju Y., Accelerated ignition-shock coupling and deflagration to detonation transition by ozone kinetic enhancement of dimethyl ether Mixture. *Proceedings of the Combustion Institute*. (**accepted**)

Submitted papers

- J15) **Thawko A.**, Akiba T., Wang Z., Mei B., Maruta K., Ju Y., Effect of pressure on low-temperature reactivity and extinction of diethyl ether non-premixed cool flame. (**Under revision**)
- J16) Shi Z., Mao X., **Thawko A.**, Ju Y., Numerical modeling of plasma assisted deflagration to detonation transition in a microscale channel. (**Under revision**)
- J17) Mei B., Wang Z., **Thawko A.**, Liu N., Thompson L., Attinger J., Ju Y., Dimethoxymethane low- to intermediate-temperature oxidation up to 100 atm. (**Under revision**)
- J18) Diskin D., Pisnoy S., Ben-Hamo I., **Thawko A.**, Tartakovsky L., Decarbonizing Transportation: A Critical Examination of Strategy Effectiveness within Sustainable Energy Capacity Constraints. (**Under revision**)

Refereed papers in conference proceedings

- C1) Tartakovsky L., Eyal A., **Thawko A.**, Yadav, H., A novel technology of high-pressure thermochemical recuperation for efficiency increase and emissions mitigation. 23rd International Transport and Air Pollution Conference Thessaloniki, Greece, May 15-17, 2019.
- C2) **Thawko A.**, Wang Z., Sakamoto R., Liu N., Ju Y., Observation of two cool flame regimes in a diffusion counterflow burner. 13th United States National Combustion Meeting, USA Texas, March 19-22, 2023.

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- C3) Wang Z., **Thawko A.**, Mei B., Law C., Ju Y., Structures, extinction limits, and reactivities of n-dodecane diffusion cool flames at high pressures. 13th United States National Combustion Meeting, USA Texas, March 19-22, 2023.
 - C4) **Thawko A.**, Yuanxinxin C., Madeline V., Yiguang J., Flame propagation and transition to detonation of dimethyl ether mixture in a microscale channel. ICFD2023, Japan, Sendai, November 6-8, 2023.
 - C5) Wang Z., **Thawko A.**, Mei B., Law C., Ju Y., Reactivity and extinction of n-dodecane non-premixed cool flame at High Pressure. ICFD2023, Japan, Sendai, November 6-8, 2023.
 - C6) **Thawko A.**, Vorenkamp M., Shi Z., Mao X., Yiguang J. Low-temperature kinetic enhancement of microchannel detonation transition by ozone addition to dimethyl ether mixtures. AIAA SciTech, USA Florida, January 8-12, 2024.
 - C7) **Thawko A.**, Wang Z., Mei B., Ju Y., Non-premixed cool flame and warm flame study of diethyl ether at high pressure. AIAA SciTech, USA Florida, January 8-12, 2024.
 - C8) **Thawko A.**, Holtzer BBBD., Tartakovsky L., The Dark Side of Hydrogen Combustion in Reciprocating Engine. The Eastern States Section of the Combustion Institute, USA Georgia, March 10-13, 2024.
 - C9) **Thawko A.**, Wang Z., Mei B., Shi Z., Ju Y., Ignition-Shock Coupling via Ignition Kinetic Enhancement in Deflagration to Detonation Transition of Dimethyl Ether Mixture. The Eastern States Section of the Combustion Institute, USA Georgia, March 10-13, 2024.
 - C10) **Thawko A.**, Akiba T., Wang Z., Mei B., Ju Y., New Pressure-Dependent Correlation for the Heat Release Rate of Non-Premixed Cool Flame. The Eastern States Section of the Combustion Institute, USA Georgia, March 10-13, 2024.

Patents granted

- P1) Tartakovsky L., Sheintuch M., Veinblat M., **Thawko A.**, Internal combustion engine with thermochemical recuperation of waste heat and a method for thermochemical recuperation. US Patent App. 17/597,535, 2022.

CONFERENCES

Contributed Talks and Posters

- 1) **Thawko A.**, Poran A., and Tartakovsky L. “High-pressure thermo-chemical recuperation - benefits and challenges”, The 7th World Hydrogen Technology Convention, Prague, Czech Republic, July 09-12, 2017. (poster)
- 2) **Thawko A.** and Tartakovsky L. “Multicomponent alcohol reformato mixing in a combustion chamber of ICE”, The 7th Conference on UAV Propulsion Technologies, Haifa, Israel, January 25, 2018. (poster)
- 3) **Thawko A.**, and Tartakovsky L. “Hydrogen-rich mixture formation in ICE”, SAE International Conference, SAE Waste Heat Recovery symposium, Haifa, Israel, May 23-24, 2018. (poster)
- 4) **Thawko A.**, Tartakovsky, L. Performance comparison of a direct-injection ICE in diesel and spark-ignition operation with methanol reforming products. The 8th Conference on UAV Propulsion Technologies. Haifa, Israel, January 31, 2019. (oral presentation)
- 5) **Thawko A.**, Yadav H., Shapiro M., Tartakovsky L., Particle emissions of a direct injection IC engine fed with a hydrogen-rich gaseous fuel. The 23rd Conference on Combustion Generated Nanoparticles. Zurich, Switzerland, June 17 – 20, 2019. (oral presentation)
- 6) **Thawko A.**, Yadav H., Shapiro M., Tartakovsky L. “Particle emission from direct injection internal combustion engine fed by hydrogen-rich reformato. European Aerosol Conference, Gothenburg, Sweden, August 25-30, 2019. (poster)

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- 7) **Thawko A.**, Tartakovsky L., RANS simulation of a multicomponent underexpanded gaseous jet mixing - effects of composition and injection condition. The 25th SAE Small Engine Technology Conference. Hiroshima, Japan, November 19-21, 2019. (oral presentation)
 - 8) **Thawko A.**, Eyal A., Shapiro M., Tartakovsky L., A comparative analysis of ultrafine particle emissions by a garbage truck with CNG and diesel engine retrofitted with a diesel particle filter. European Aerosol Conference (virtual event), August 31 – September 4, 2020. (poster)
 - 9) **Thawko A.**, Yadav H., Shapiro M., Tartakovsky L., Effect of lubricant oil Formulation on characteristics of particle emission from engine fed with a hydrogen-rich fuel. SAE Powertrains, Fuels and Lubricants Digital Summit. September 22-23, 2020. (oral presentation)
 - 10) **Thawko A.**, Persy S.A, Eyal A., Tartakovsky L., Effects of fuel injection method on energy efficiency and combustion characteristics of SI engine fed with a hydrogen-rich reformat. SAE Powertrains, Fuels and Lubricants Digital Summit. September 22-23, 2020. (oral presentation)
 - 11) **Thawko A.**, Shapiro M., Tartakovsky L., Particle emission from direct injection internal combustion engine fed with various gaseous fuels. The 24th Conference on Combustion Generated Nanoparticles (virtual event), June 22 – 24, 2021. (oral presentation)
 - 12) **Thawko A.**, Shapiro M., Tartakovsky L., Comparative analysis of particle emission from direct and port injection internal combustion engine fed with hydrogen, methane, and hydrogen-rich reformat. European Aerosol Conference (virtual event), August 30 – Sep. 3, 2021. (oral presentation)
 - 13) **Thawko A.**, Tartakovsky L., Particle formation in ICE hydrogen combustion. SAE World Congress, USA, Detroit, April 5 – 7, 2022. (oral presentation)
 - 14) **Thawko A.**, Wang Z., Sakamoto R., Liu N., Ju Y., Observation of two cool flame regimes in a diffusion counterflow burner. 13th United States National Combustion Meeting, USA Texas, March 19-22, 2023. (oral presentation)
 - 15) **Thawko A.**, Madeline V., Yiguang J., Schlieren visualization of DME mixture flame transition to detonation in a microscale channel. GRC Laser Diagnostics in Energy and Combustion Science, Maine, United States, July 9 - 14, 2023. (poster)
 - 16) **Thawko A.**, Yuanxin C., Madeline V., Yiguang J., Flame propagation and transition to detonation of dimethyl ether mixture in a microscale channel. ICFD2023, Japan, Sendai, November 6-8, 2023. (oral presentation)
 - 17) **Thawko A.**, Vorenkamp M., Shi Z., Mao X., Ju Y., Low-temperature kinetic enhancement of microchannel detonation transition by ozone addition to dimethyl ether mixtures. AIAA SciTech, USA Florida, January 8-12, 2024. (oral presentation)
 - 18) **Thawko A.**, Wang Z., Mei B., Ju Y., Non-premixed cool flame and warm flame study of diethyl ether at high pressure. AIAA SciTech, USA Florida, January 8-12, 2024. (oral presentation)
 - 19) **Thawko A.**, Holtzer BBBD., Tartakovsky L., The Dark Side of Hydrogen Combustion in Reciprocating Engine. The Eastern States Section of the Combustion Institute, USA Georgia, March 10-13, 2024. (oral presentation)
 - 20) **Thawko A.**, Wang Z., Mei B., Shi Z., Ju Y., Ignition-Shock Coupling via Ignition Kinetic Enhancement in Deflagration to Detonation Transition of Dimethyl Ether Mixture. The Eastern States Section of the Combustion Institute, USA Georgia, March 10-13, 2024. (oral presentation)
 - 21) **Thawko A.**, Akiba T., Wang Z., Mei B., Ju Y., New Pressure-Dependent Correlation for the Heat Release Rate of Non-Premixed Cool Flame. The Eastern States Section of the Combustion Institute, USA Georgia, March 10-13, 2024. (oral presentation)
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- 22) **Thawko A.**, Yuanxin C., Shi Z., Vorenkamp M., Wang Z., Mei B., Mao X., Ju Y., Accelerated ignition-shock coupling and deflagration to detonation transition by ozone kinetic enhancement of dimethyl ether Mixture. The 40th International Symposium - Emphasizing Energy Transition, Italy, Milan, July 21-28, 2024.

Participation in organizing conferences

Princeton-Combustion Institute Summer School on Combustion and the Environment 2023 – 2024
Princeton University Princeton, NJ

Leading all aspects of the organization and coordination for the 13th and 14th summer schools.
Lectures were given by 6 leading experts and more than 150 international participants attended.

LEADERSHIP AND SERVICE

Asian American Association for Science Engineering summer school Princeton, NJ
Princeton University 2022 – 2024

Helped organize science and technology-focused summer school for high-school students. Also, I served as a mentor for the group project session during summer school, and my teams won the first prizes in all the competitions.

The "Circassian Ambassador" Project Kfar-Kama, IL
"To Be"- The Israeli-Circassian Youth Center 2019-2022

The project goal is to promote and integrate the Circassian community into Israeli society.
As part of the project, I initiated an idea for a multi-language book. I wrote and published two children's books in Hebrew and Circassian languages.

FIRST Robotics LEGO League Kfar-Kama, IL
Adiga Junior High School 2017 – 2021

Voluntary activities with youth include mentoring, teaching, guiding, and developing a positive attitude toward science. In 2020 our team won the 2nd prize in the research competition for our innovative project.

Emergency Medical Technician Tiberias, IL
Magen David Adom in Israel 2020- 2021

Voluntary activity as part of an ambulance medical team. In addition, I am a member of the first response team to emergencies requiring medical treatment in my hometown.

Kfar-Kama's Learning Center- "פרויקט בגרורות" Kfar-Kama, IL
Kfar-Kama Community Center 2005-2014

Voluntary activity of teaching and preparing high school students for matriculation exams in math, physics, and chemistry to increase the number of Circassian students attending these subjects at 5 points level.