



Exponent[®]
Engineering & Scientific Consulting

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Professional Profile

Dr. Nasir has a background in mechanical engineering and specializes in experimental studies of combustion systems and chemical kinetics. He is also an expert in the development and application of infrared laser diagnostics for gas sensing in harsh environments. At Exponent, Dr. Nasir has assisted with the investigation of residential fires and explosions.

Prior to joining Exponent, Dr. Nasir held a postdoctoral research associate position at the Engine Research Center in UW-Madison, where he conducted laser tomography measurements of gas concentration in automobile engine exhaust. He completed his Ph.D. at KAUST, Saudi Arabia, where his thesis focused on the application of in-situ mid-infrared laser diagnostic techniques for gas concentration and temperature in hydrocarbon oxidation experiments. His graduate work resulted in the experimental validation of kinetic phenomena such as ignition delay times, elementary chemical reaction rates and low-temperature heat release.

Dr. Nasir has extensive experience with optical technologies such as semiconductor diode lasers, quantum cascade lasers and Ring-dye lasers. He also has experience with high pressure and high temperature experimental systems such as shock tubes, rapid compression machines and IC engines. In his experiments, Dr. Nasir has made extensive use of data acquisition hardware and software from National Instruments ®.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, King Abdullah University of Science and Technology, Saudi Arabia, 2018

M.S., Mechanical Engineering, King Abdullah University of Science and Technology, Saudi Arabia, 2014

B.S., Mechanical Engineering, Ghulam Ishaq Khan Institute of Engineering Sciences and Technology, Pakistan, 2012

Prior Experience

Research Associate, Engine Research Center, University of Wisconsin - Madison, 2018 – 2019

Professional Affiliations

National Association of Fire Investigators

National Fire Protection Association

Languages

Urdu

Publications

Nasir EF, Farooq A. Intra-pulse H₂O absorption diagnostic for temperature sensing in a rapid compression machine. *Applied Physics B* 2019; 125:210.

Nasir EF, Farooq A. Cavity-enhanced absorption sensor for carbon monoxide in a rapid compression machine. *Proceedings of the Combustion Institute* 2019; 37:1297-1304.

Sarathy SM, Tingas SA, Nasir EF, Detogni A, Wang Z, Farooq A, Im H. Three-stage heat release in n-heptane auto-ignition. *Proceedings of the Combustion Institute* 2019; 37:485-492.

Nasir EF, Farooq A. Intra-pulse laser absorption sensor with cavity enhancement for oxidation experiments in a rapid compression machine. *Optics Express* 2018; 26:14601-14609.

Ahmed A, Hantouche M, Khurshid M, Mohamed SY, Nasir EF, Farooq A, Roberts WL, Knio OM, Sarathy SM. Impact of thermodynamic properties and heat loss on ignition of transportation fuels in rapid compression machines. *Fuel* 2018; 218:203-212.

Lee C, Ahmed A, Nasir EF, Badra J, Kalghatgi G, Sarathy SM, Curran H, Farooq A. Autoignition characteristics of oxygenated gasolines. *Combustion and Flame* 2017; 186:114–128.

Nasir EF, Farooq A. Time-resolved temperature measurements in a rapid compression machine using quantum cascade laser absorption in the intrapulse mode. *Proceedings of the Combustion Institute* 2017; 36:4453-4460.

Javed T, Nasir EF, Ahmed A, Badra J, Djebbi K, Beshir M, Ji W, Sarathy SM, Farooq A. Ignition delay measurements of light naphtha: A fully blended low octane fuel. *Proceedings of the Combustion Institute* 2017; 36:315-322.

Atef N, Kukkadapu G, Mohamed SY, Al Rashidi M, Banyon C, Mehl M, Heufer KA, Nasir EF, Alfazazi A, Das AK, Westbrook CK, Pitz WJ, Lu T, Farooq A, Sung CJ, Curran HJ, Sarathy SM. A comprehensive iso-octane combustion model with improved thermochemistry and chemical kinetics. *Combustion and Flame* 2017; 178:111–134.

Ayass WW, Nasir EF, Farooq A, Sarathy SM. Mixing-structure relationship in jet-stirred reactors. *Chemical Engineering Research and Design* 2016; 111:461-464.

Nasir EF, Farooq A. A Shock-Tube Study of the CO+ OH Reaction Near the Low-Pressure Limit. *The Journal of Physical Chemistry A* 2016; 120:3924-3928.

Elwardany A, Nasir EF, Es-sebbar E, Farooq A. Unimolecular decomposition of formic and acetic acids: A shock tube/laser absorption study. *Proceedings of the Combustion Institute* 2015; 35:429-436.

Chrystie RSM, Nasir EF, Farooq A. Towards simultaneous calibration-free and ultra-fast sensing of temperature and species in the intrapulse mode. *Proceedings of the Combustion Institute* 2015; 35:3757-3764.

Chrystie RSM, Nasir EF, Farooq A. Propene concentration sensing for combustion gases using quantum-cascade laser absorption near 11 μm . *Applied Physics B* 2015; 120:317-327.

KC U, Nasir EF, Farooq A. A mid-infrared absorption diagnostic for acetylene detection. *Applied Physics*

B 2015; 120:223-232.

Javed T, Nasir EF, Es-sebbar E, Farooq A. A comparative study of the oxidation characteristics of two gasoline fuels and an n-heptane/iso-octane surrogate mixture. Proceedings of the Combustion Institute 2015; 35:201-208.

Chrystie RSM, Nasir EF, Farooq A. Ultra-fast and calibration-free temperature sensing in the intrapulse mode. Optics Letters 2014; 39:6620-6623.

Badra J, Nasir EF, Farooq A. Site-Specific Rate Constant Measurements for Primary and Secondary H- and D-Abstraction by OH Radicals: Propane and n-Butane. The Journal of Physical Chemistry A 2014; 118:4652-4660.

Peer Reviewer

Proceedings of the Combustion Institute

Applied Sciences

Optics Express