The Combustion Institute
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Postdoctoral

Supercritical carbon dioxide (SCO2) power cycles offer a potential pathway to highly efficient power generation (59% with natural gas) and economically viable, direct carbon capture at pipeline pressure. At the core of this revolutionary approach to power generation is a direct-fired oxyfuel combustor at 300 bar, featuring a stream of regeneratively heated supercritical CO2 (up to 90% of the total flow, with temperature of ~1000 K), oxygen and fuel in stoichiometric ratio. Pioneers in industry are developing pilot power-plants, but they rely on combustion data and models that are inadequate. At KAUST, you will have a unique opportunity to impact the development of this cutting-edge technology

Project Overview: Raman Spectroscopy in Combustion at Extreme Conditions

No quantitative experimental data are available in combustion at conditions relevant to direct-fired oxyfuel combustion in supercritical CO2. At these extreme pressures, most conventional combustion laser diagnostics approaches are inadequate, but new promising strategies become viable. The postdoctoral appointee will work on the development of novel high-speed diagnostics for accurate temperature and species measurements in extreme pressure combustion environments. Both high-speed nanosecond, and low-speed picosecond laser techniques will be explored, taking advantage of the unique facilities and state-of-the-art diagnostic laboratories at KAUST.

The appointee will work in an interdisciplinary team with expertise in combustion, chemistry and fluid mechanics. As part of the postdoctoral tenure, the appointee will assist with the supervision of graduate students and collaborate with visiting scientists from other institutions. The successful candidate will conduct independent research under the mentorship of Professor Magnotti and will be expected to publish in the open literature.

Qualifications

Successful candidates must have a Ph.D. in engineering, applied physics or other close fields. Strong verbal and written communication skills in English, and the ability to work in an interdisciplinary and international team are required.

Candidates should have a proven record of original contributions in laser diagnostics for combustion research. Either experience with pulse-burst lasers, or pico-second lasers is desirable. Preference will be given to candidates with experience in Raman spectroscopy, CARS, LIGS, or related techniques.

Benefits and How to Apply

Competitive salary, free housing, medical, dental and life insurance, relocation allowance and yearly air travel allowance. No income tax is paid in Saudi Arabia. Applications will be reviewed until the position is filled. Prospective candidates should contact Professor Gaetano Magnotti (gaetano.magnotti@kaust.edu.sa).