



# Postdoctoral opportunities in “Experimental investigation of ammonia laminar and turbulent flames at atmospheric and elevated pressures”

The Advanced Laser Diagnostics and Turbulent Combustion lab, affiliated with the [CCRC](#) at KAUST has an immediate opening for a qualified postdoctoral researcher to experimentally investigate *ammonia turbulent flames at atmospheric and elevated pressures*. Ammonia is a promising carbon-free e-fuel for propulsion and power, thanks to a mature production and distribution network. Combustion of pure ammonia is challenging, because of its low heating value, low flame speed, absence of soot, and increased complexity in the formation and consumption of NO<sub>x</sub>. Our project aims to deepen our understanding of ammonia combustion with a focus on: 1) turbulence-chemistry interaction in pure, and partially cracked ammonia flames; 2) effects of preferential diffusion on the flame microstructure and pollutants formations in bluff-body stabilized flames; 3) “in-situ” ammonia decomposition and its effects on the flame microstructure and pollutant formation under MILD combustion conditions. 4) effect of pressure on the flame structure and on NO<sub>x</sub> formation.

The postdoctoral appointee will couple 1D Raman/Rayleigh measurements of temperature and major species to LIF of OH, NO, NH, NO<sub>2</sub> and NH<sub>2</sub> to provide quantitative measurements of these key radicals at atmospheric and elevated pressures. Laminar counterflow flames will provide a platform for diagnostics development, and validation of chemical kinetics mechanism. Detailed measurements in bluff-body stabilized turbulent flames and jet in hot-coflow will reveal the structure of the flame, quantify in-situ decomposition of ammonia, and unveil NO<sub>x</sub> formation and consumption routes. The data will also be instrumental in developing and validating numerical models for turbulent ammonia-air flames at gas-turbine relevant conditions, and will be shared within the [TNF](#) workshop.

The appointee will work in an interdisciplinary team with expertise in laser diagnostics, 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 record of original contributions in combustion research and/or laser diagnostics.

## **Benefits**

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. Expected start-date is Summer 2023 or sooner.

## **How to Apply**

Prospective candidates should email Professor Gaetano Magnotti ([gaetano.magnotti@kaust.edu.sa](mailto:gaetano.magnotti@kaust.edu.sa)) a package that includes: (i) a brief cover letter describing their background and interest in the position, (ii) a C.V., (iii) two representative publications, and (iv) names and email addresses of three referees.