Univerza
*v Ljubljani*

Fakulteta *za kemijo*
*in kemijsko tehnologijo*

*p.p. 537, Večna pot 113*
*1001 Ljubljana*
*telefon: 01 479 80 00*
*faks: 01 241 91 44*
*dekanat@fkkt.uni-lj.si*

# VABILO NA PREDAVANJE V OKVIRU DOKTORSKEGA ŠTUDIJA KEMIJSKE ZNANOSTI / INVITATION TO THE LECTURE WITHIN DOCTORAL PROGRAMME IN CHEMICAL SCIENCES

**Prof. Xin Tu, PhD**

*Department of Electrical Engineering and Electronics,*
*University of Liverpool*

z naslovom / title:

## Non-thermal plasma: An emerging electrification technology for sustainable production of fuels and chemicals

**v sredo, 6. 3. 2024 ob 15. uri /**
**on Wednesday, 6. 3. 2024 at 15.00**
**v predavalnici 1** v 1. nadstropju Fakultete za kemijo in kemijsko tehnologijo, Večna pot 113 **/ in lecture room 1,** 1st floor at the Faculty of Chemistry and Chemical Technology, Večna pot 113

*Vljudno vabljeni! / Kindly invited!*

**Abstract:**

Non-thermal plasma (NTP) has been regarded as a promising electrification technology for the synthesis of fuels and chemicals from a range of carbon and nitrogen sources such as $CH_4$, $CO_2$, biogas, biomass and nitrogen [1-6]. In NTPs, the gas kinetic temperature can be as low as room temperature, while the electrons are highly energetic (1-10 eV), which is sufficient to activate strong chemical bonds of inert molecules (e.g., $CO_2$, $CH_4$ and $N_2$) and produce a variety of reactive species including radicals and excited species for chemical reactions. This unique non-equilibrium character of NTP offers the potential to enable thermodynamically unfavorable reactions to proceed (e.g., $CO_2$ conversion and $N_2$ activation) at ambient conditions [2-4]. Furthermore, plasma processes can be instantaneously switched on and off, offering great flexibility in decentralized production of fuels and chemicals using renewable energy sources, particularly intermittent renewable energy. Combining NTP with heterogeneous catalysis holds immense potential to achieve a synergistic effect via the interactions between the plasma and catalysts. This interaction can activate catalysts at low temperatures, enhancing their activity and stability, leading to a remarkable increase in conversion, selectivity, and yield of end-products, as well as improving energy efficiency. This presentation will discuss the challenges and opportunities in plasma-based chemical reactions for the synthesis of fuels and chemicals, including nitrogen fixation/ammonia synthesis, $CH_4$ activation, $CO_2$ conversion and syngas cleaning [1-4].

**References**

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