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| הפקולטה להנדסה כימית  ע"ש וולפסון |  |  |
| The Wolfson Department of Chemical Engineering |  |  |

**Wolfson Department of Chemical Engineering Seminar**

**Zoom seminar** <https://technion.zoom.us/j/91828389738>

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**“Coordination driven single atom electrocatalysts in doped graphitic materials for hydrogen production”**

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Molecular hydrogen which has the highest energy density and non-polluting characteristics compared to other fuels is regarded as one of the most promising sustainable fuel. There are various methods to produce hydrogen, among which water splitting driven by electricity generated from renewable energy sources is an attractive way to support the future hydrogen economy. Two half reactions, *i.e.*, the hydrogen evolution reaction (HER) on the cathode and the oxygen evolution reaction (OER) on the anode, are involved in water splitting.1 Although various earth-abundant materials have been proven to be efficient catalysts for oxygen and hydrogen evolution, such as transition metal oxides/hydroxides, phosphates/phosphides and metal-organic frameworks, many of them cannot meet the aforementioned commercial criteria for water-electrolyzer, and most importantly they may not survive long in high-current operation.1,2 In contrast to heterogeneous catalysts, single-atomic site catalysts (SASCs) possessing homogeneous active sites, maximizes the atom utilization with tunable electronic environments for the unprecedented catalytic activity, stability, and selectivity.1 Transition metal atoms (such as Pt and Ru) coordinated by CnNm (n, m: nonnegative integer where n+m is generally ≤ 4) on graphitic surface have shown highly active electrochemical catalysis for hydrogen generation.3-5 The coordination environment as well as the intrinsic atomic properties of single atoms governs the electrochemical properties. In addition, the conductivity of substrates containing the transition metal atoms is of vital importance in accelerating electrochemical reactions. Therefore, we discuss such key factors of the adatoms or embedded atoms on/in substrates for the design of novel atomistic catalysts towards better electrochemical reactions.