

## **Adsorption of toxic pollutants from water and wastewaters**

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### **Abstract** *(times new roman, font size 12, word limit 200, and spacing 1.15)*

In this work, we have synthesized black gold<sup>1</sup> (using DFNS<sup>2-4</sup>) based antenna reactor of nickel (DPC-C4-Ni), where Ni is deposited on black gold. The hot electrons<sup>5</sup> produced in Au transferred to the Ni and the intense electric field around the Ni interacts with the reactant molecules adsorbed. This resulted in bond activation of several challenging reactions like H<sub>2</sub> dissociation, C-Cl bond activation, CO<sub>2</sub> reduction, and hydrogenation of propene and acetylene at room temperature. Under light excitation, DPC-C4-Ni outperforms DPC-C4 and DFNS-Ni in terms of activity, demonstrating the "antenna-reactor" concept. The reaction mechanism was explored by i) one-electron reduction of Fe<sup>3+</sup> to Fe<sup>2+</sup>, ii) competitive C-Cl bond activation and Fe<sup>3+</sup> reduction, iii) finite-difference time-domain simulations (FDTD), and iv) ultrafast transient absorption spectroscopy.

### **References** *(maximum 5, times new roman, font size 10, and spacing 1.15)*

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