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## **ELECTROCHEMICAL–CATALYTIC REDUCTION OF NITRATE OVER Pd–Cu/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub> CATALYST IN CATHODE CHAMBER: ENHANCED REMOVAL EFFICIENCY AND N<sub>2</sub> SELECTIVITY**

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The Pd–Cu/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub> catalysts were prepared by impregnation method and introduced into the cathode chamber of a divided electrochemical denitrification cell with two graphite plates as the cathode and anode, to enhance the nitrate removal efficiency and N<sub>2</sub> selectivity. The Pd–Cu/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub> catalysts were characterized by transmission electron microscope (TEM), x-ray diffraction (XRD), specific surface area measurements using BET and inductively coupled plasma–atomic emission spectrometry (ICP–AES). In the rationally designed electrochemical–catalytic (ECC) system, the as–prepared catalyst could significantly enhance the nitrate degradation rate to 1.08 mg/L at current density of 10 mA/cm<sup>2</sup>, which was approximately 2.5 times compared with the electrochemical (EC) system without catalysts adding in. Additionally, a higher nitrogen selectivity of 80.37% was obtained under the same experiment condition. The improved

performances were likely due to the presence of a catalytic reduction reaction of nitrate with the appropriate amount of hydrogen generated by electrolysis as reductant. Significantly, the current efficiency was calculated and enhanced value of 20% to 40% (depended on current density) was obtained in the ECC process with a catalyst content of 1.0 g/L.

### **Biography**

Zhiqiang Zhang is a PhD student from School of Municipal and Environmental Engineering, Harbin Institute of Technology. His research direction is novel catalyst development and application in the field of environmental science and technology, especially in the removal of oxyanion, such as nitrate, perchlorate and bromate from water by catalytic hydrogenation reduction method using Pd- or Pt-based catalyst.

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