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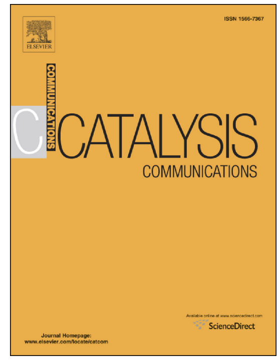

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Chuan Liang, Beibei Wang, Shengtao Xing

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Growth of iron (hydr)oxides on different carbon substrates and their Fenton-like performance

Chuan Liang, Beibei Wang, Shengtao Xing*

College of Chemistry and Material Science, Hebei Normal University, Shijiazhuang 050024, PR China

E-mail: stxing07@sina.com; Tel: +86 311 80787406; fax: +86 311 80787402

Abstract: Iron (hydr)oxides were deposited on different carbonaceous materials carriers and their Fenton-like performance was critically evaluated. The solid carbon substrate significantly affected the crystal structure of the iron-containing phase. In particular, a layer of α-FeOOH was formed on the surface of hydrochar microsphere at pH=6 and T=60 °C without any additives for the synthesis conditions applied. Among the other obtained samples, the latter exhibited the highest catalytic activity, expressed either per gram of Fe metal or per total surface area basis, and the highest stability as well towards degradation of Orange II in the presence of H_2O_2. This is suggested to be due to the core@shell structure of hydrochar microsphere@α-FeOOH and its favorable catalytic mechanism and kinetics as compared to previously reported FeOOH Fenton catalysts. H_2O_2 mainly reacted with photo-generated holes rather than Fe(II)/(III) and photo-generated electrons to produce superoxide radicals.

***Keywords*:** Hydrochar; α-FeOOH; Photo-Fenton activity; Photocatalytic degradation of Orange II.