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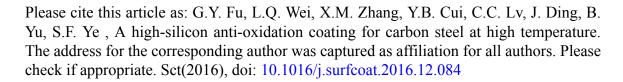
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## ACCEPTED MANUSCRIPT

# A high-silicon anti-oxidation coating for carbon steel at high temperature

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#### **Abstract:**

A high-silicon anti-oxidation coating for carbon steel at high temperature was prepared, which was mainly composed of high-silicon carbide, chromium and binder. The anti-oxidation performance of the coated and uncoated specimens were investigated from 900℃ to 1150℃ maintained for 60 and 120 min, respectively. Compared with the uncoated specimen, the high-silicon coating could enhance the anti-oxidation effect ~77% at 1000℃ for 60 min and 85% at 1050 ℃ for 120 min, respectively. Scanning electron microscope and Energy Dispersive Spectrometer, X-ray Diffraction and TG-DTA technology were used to investigate the protection mechanism of high-silicon coating. First, during high-temperature treatment, there was a big blister formed in the coating because of the chemical reactions of the compositions, which isolated the steel substrate from oxygen. Second, it was found that a series of materials (such as Fe<sub>2.35</sub>Si<sub>0.65</sub>O<sub>4</sub>, Fe<sub>2.45</sub>Si<sub>0.55</sub>O<sub>4</sub>, Fe<sub>2.95</sub>Si<sub>0.05</sub>O<sub>4</sub> and FeCr<sub>2</sub>O<sub>4</sub>)

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