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Influence of Heat and Laser Treatments on the Corrodibility of the Reinforced Carbon Steel

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The influence of heat and laser treatments on the corrosion behavior of reinforced carbon steel was investigated in calcium hydroxide solution using weight loss, photodynamic polarization measurements, X-ray diffraction (XRD) and Scanning Electron Microscope (SEM). Heat and laser treatments play an important role for improvement of the mechanical and corrosion resistance of the reinforced carbon steel. The corrosion rate of laser alloyed sample is very close to that of the sample treated with low heat treatment (900 ^{o}C) and is lower than that experienced for the sample treated at higher one (1200 ^{o}C). The results may be attributed to uneven distribution of Ti and V micro-alloying element throughout the surface and low grain refinement for treated sample at high heat treatment (1200 ^{o}C).

Keywords: Heat treatment, Laser, Micro-alloyed steel, Titanium, Vanadium, XRD, Polarization, SEM

1. INTRODUCTION

Construction and design problems have led to an early deterioration of concrete structures, reducing their residual service life as the infrastructure is aged in a corrosive environment. Corrosion of reinforcement steels is one of the main causes for the deterioration [1,2] and pitting corrosion of reinforcement steels and is considered as the most disastrous form of corrosion due to an extremely difficult to be predicted [3]. A lot of work has been done to investigate compositions of different types of concrete and their effect on the corrosion behavior of steels [4–12] and the electrochemical