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SURFACE MODIFICATION OF 316L STAINLESS STEEL BY PLASMA-ASSISTED LOW TEMPERATURE CARBURIZING PROCESS

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This paper aims at improving the hardness and wear resistance of Austenitic 316L Stainless Steel (SS) by Plasma-assisted Low Temperature Carburizing (PLTC) process. The process has been employed in austenitic 316L SS for achieving carbon supersaturated phase, the so-called "S Phase". The microstructure of the treated specimens was characterized by Optical microscopy, Scanning Electron Microscopy (SEM) and X-Ray Diffraction (XRD). The results showed evidences of expanded austenite phase and formation of "S phase" at a temperature of 460°C with 10% of methane (CH_4) and 90% of hydrogen (H_2) at a pressure of 1mbar for a time period of 20 h. The hardness of the specimen was evaluated as 1030 HV using Vickers microhardness setup. The wear behavior of plasma treated specimen was studied using pin on disc test at ambient condition and the results are discussed. Wear rate in PLTC 316L SS was observed to be low when compared with the wear rate of the untreated 316L SS specimen. The PLTC 316L SS specimen is subjected to ASTM A262 oxalic acid etch test to study the intergranular corrosion behavior. The "step" formation was observed in the SEM micrographs which reveal the retention of corrosion resistance in the specimen.

Keywords: Surface modification; plasma treatment; carburizing; wear; stainless steel; microhardness.

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