

The behavior of hydrogen absorption into high-strength steel sheet under atmospheric corrosion environment

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These days, ultra-high-strength steel sheets are applied to automobile bodies to reduce body weight and improve crash safety. However, one of the problems associated with such applications is hydrogen embrittlement (HE). The factors contributing to the occurrence of HE include steel strength, stress, and the amount of absorbed hydrogen. In our previous study, a hydrogen monitoring system was developed to measure the accurate amount of absorbed hydrogen based on the electrochemical hydrogen permeation method.

In this presentation, the hydrogen absorption behaviors of Ultra High Strength Steel (UHSS) were investigated in a corrosive atmospheric environment using a developed system. In the automotive sector, UHSS is utilized after undergoing press processing; therefore, steel sheets subjected to strain were employed in laboratory dry-wet corrosion test cycles to examine the effects of temperature and salt load. The results indicated a tendency for amount of absorbed hydrogen to increase with higher temperature and larger salt load. This trend was consistent with that observed in mild steel; however, the amount of absorbed hydrogen was significantly larger in UHSS. Furthermore, it was demonstrated that the amount of absorbed hydrogen increased with the level of strain applied. Additionally, the results of exposure tests conducted in Thailand will be compared, and the relationship between absorbed hydrogen and environmental factors will be discussed.

Graphical Abstract

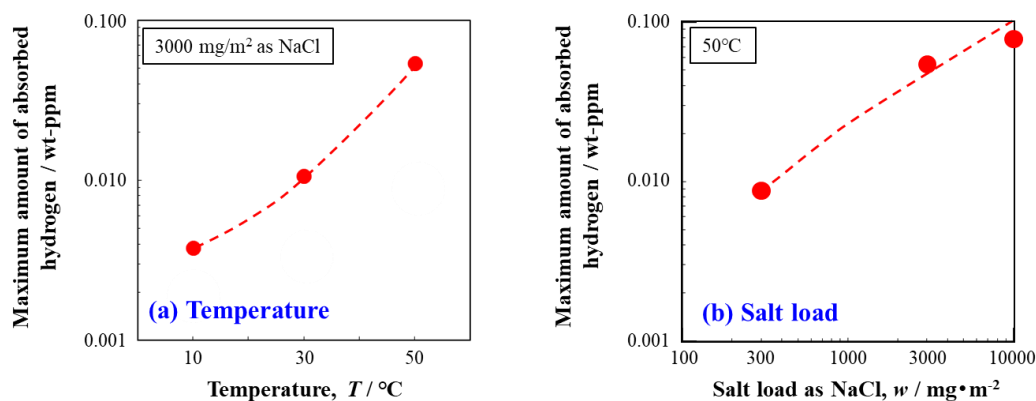


Figure Relationship between amount of absorbed hydrogen and environmental factors
(a) Temperature (b) Salt load