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## A study of strain-induced martensite characteristics of austenitic stainless steels

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**S**tatement of the Problem: In order to understand the formation of strain-induced martensite (SIM) of austenitic stainless steels, phase textures were investigated both before and after static and cyclic loading, namely plastic deformation is made intentionally. Moreover, in-situ measurements of the strain-induced martensitic transformation that takes place during tensile loading at room temperature were performed. Even in the low plastic strain regime, with loading to yield stress, the SIM transformation occurred. However, the area fraction of the martensite formation did not increase significantly even when the sample was loaded to the ultimate tensile strength. On the other hand, by the cyclic loading, the area fraction of the martensite formation increases significantly when the maximum cyclic load is more than 80%UTS. In other word, the SIM formation is apparently absent when the samples are loaded with less than 70%UTS, although those samples are fractured completely. No clear frequency effect (1Hz vs. 30Hz) is detected. With the analysis, two different SIM characteristics were clarified following plastic deformation. The martensitic structures were obtained in the twin deformation and slip bands. The severity of martensite formation increased with increasing C content. It was found that martensite was formed mainly in austenitic stainless steel lacking Mo, whereas a high Mo content led to a strong martensite structure, i.e., a weak martensite. The formation of martensite occurred from austenite via martensite, and was related to the slip deformation. The Mo element in austenitic stainless steel had high slip resistance (or stress-induced martensite transformation), due to the large size of the Mo atom. This resulted in the creation of weak martensite. The phase structures of the strained austenitic stainless steels were interpreted using a proposed, i.e., the martensitic transformations.

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