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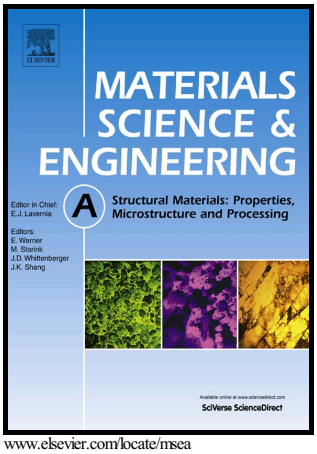

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Microstructure evolution and mechanical properties in 718H pre-hardened mold steel during tempering

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Abstract: The effects of tempering temperature on the microstructure and mechanical properties of 718H pre-hardened mold steel were investigated. After normalizing and quenching treatments, seven specimens were tempered at a temperature in the range of 500 to 650°C for two hours. After heat treatments, the tempered microstructures were characterized by X-ray diffraction, scanning electron microscopy (SEM), and transmission electron microscopy. In addition, the phase identification and microchemistry of tempered carbides were performed by the physicochemical phase analysis method; then the precipitation sequence of tempered carbides was examined in detail by transmission electron microscopy and selected area electron diffraction patterns. Results indicate that the yield strength, ultimate tensile strength, and the hardness decrease; in contrast, impact energy increases with the increase in tempering temperature. The influence of tempering temperature on mechanical properties of 718H steel is attributed to the precipitation of tempered carbides, the recovery of the martensite lath, the dislocation density, and the grain structure. Furthermore, a more