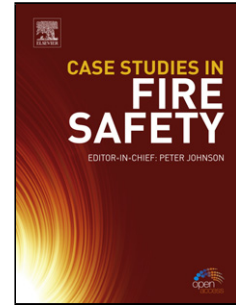


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Development of gradient microstructure in mild steel and grain size dependence of its electrochemical response

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Highlights

- A novel method to develop graded microstructure is introduced.
- Controlled surface deformation by forging and recrystallization was employed.
- Effect of grain size on the corrosion behavior of mild steel was studied.
- Effect of passivating and non-passivating medium on corrosion behavior was analysed.
- Corrosion resistance was found to decrease with decrease in grain size.

Abstract

This work discusses a novel technique to develop graded microstructure consisting of fine grains on the surface and coarse grains in the interior. It consisted of preferential surface deformation by placing hardened steel rods and subsequent forging to flatten it out. Using the above technique, four microstructures consisting of different grain sizes were fabricated. Dependence of their corrosion behavior on grain size and boundary fraction was examined using 0.6M NaCl and 15.6M HNO₃ solutions. Corrosion resistance was found to be lowest for the fine grained steel specimen as compared to that of the specimens with relatively coarser grains.

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