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## **Green Manganese steel from remelting of hydrogen based Direct Reduced Iron (DRI) and green Ferroalloy: a CO<sub>2</sub> free approach**

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Manganese is an important alloying element used in steel industry and is mostly used for increasing the strength without compromising the ductility. Currently, manganese is added as ferromanganese in steel to form manganese steel. Hence the final steel formation goes through series of steps after primary raw materials extraction, namely, ironmaking, crude steel production, ferromanganese production, steel refining and alloying to get the desired product. Carbon is used as the major reductant to produce iron and ferromanganese, which causes significant emission of CO<sub>2</sub>. To reduce this greenhouse gas emission, new innovative technology needs to be adopted using greener reductant as an alternative to carbon. In the present work, hydrogen for the reduction of Iron from iron ore pellets was used. The produced Direct Reduced Iron (DRI) was then flux-smelted in induction furnace with lime acting as a fluxing agent to obtain iron metal with low carbon. The obtained iron was then melted with green ferromanganese in certain proportions to obtain steels with composition close to the composition of Hadfield, Transformation Induced Plasticity Steel) (TRIP) and (Twining-Induced Plasticity steel) TWIP steel. The results showed that the hardness of the produced steel was similar or better than the conventional steel and the proposed process emits no CO<sub>2</sub>.

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