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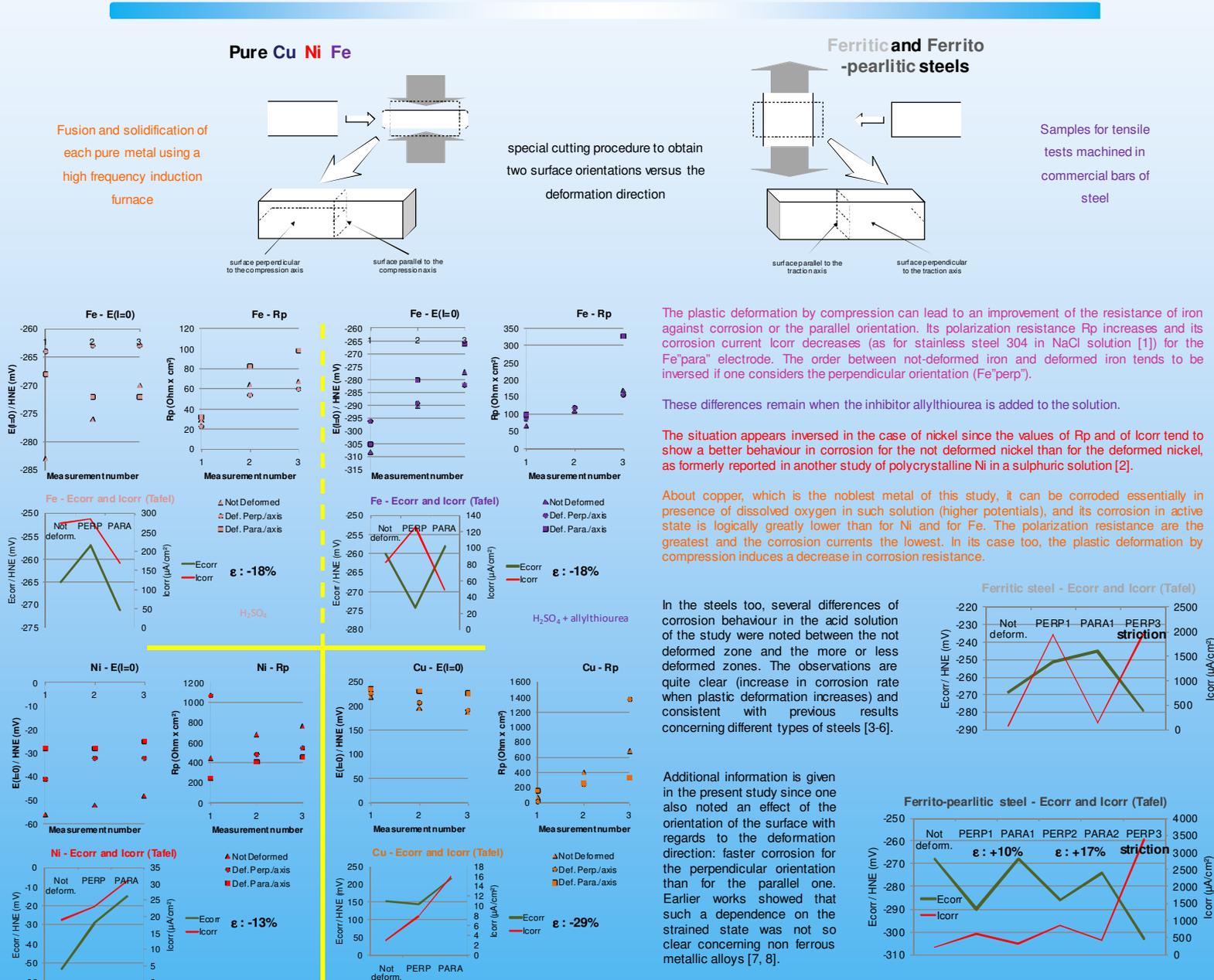
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When mechanical stresses are applied to metallic alloys these ones can be deformed elastically, and in some cases plastically, this depending on the level of the applied stresses. It is generally considered that an alloy becomes less corrosion-resistant when it is previously plastically deformed. Numerous works about the effects of a mechanical deformation on the corrosion behaviour of alloys were done since at least forty years, initially concerning cold-worked stainless steels tested in corrosion in sulphuric or chlorides-containing solutions. It appeared that the chemical composition and the fabrication conditions of the considered alloys are often too complex to deduce well established general rules in reality and several effects of the plastic deformation on the corrosion behaviour can be found, sometimes in opposite directions.

The aim of this work is to study the influences of uniaxial plastic deformations on the corrosion behaviour (characterized according to the Stern-Geary and Tafel methods) in a simple acid solution (H₂SO₄ 2N), first for pure cast metals (Cu, Ni, Fe) deformed or not in compression, and second for two carbon steels, one ferritic and one ferrite-pearlitic, deformed or not in traction.



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Plastic deformations, obtained by cold-working during an elaboration step, or resulting from mechanical stresses in service, modify the microstructures of pure metals and metallic alloys by multiplying dislocations. These ones can modify the reactivity of surface with in addition a possible influence of the orientation of the external surface with respect to the direction of the uniaxial deformation. This can modify their electrochemical behaviour, for example in situation of corrosion as here in sulphuric acid, sometimes in the good way as observed for pure iron, or more frequently with detrimental effect as seen for pure nickel or pure copper.

The corrosion behaviour of not alloyed steels also depends on both the plastic strain amount and the orientation. This potentially leads to possible accelerated corrosion in some zones of a piece with varying sections along its axis and plastically deformed in traction. This may for example occur by galvanic coupling between a not plastically deformed zone (great sections leading to elastic deformation only) and more solicited other zones (smaller sections really plastically deformed), as well as between differently oriented areas.