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Area B: Structural Materials

Symposium B8:

Title: Advanced Cast Irons and Tool Steels		
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Abstract		
<p>Associating cast irons and tool steels might appear at first as a challenge, while, on the contrary, these materials share a lot in common. As a matter of fact, they are both multi-phase materials with an iron-rich matrix and carbon-rich precipitates, and are also optimized to be cost effective with high intrinsic properties. Advances in the field of these materials require improvement in controlling the solidification process, taking into account the refining of liquid metal and the use of heat treatments which affect the distribution of the carbon-rich phases as well as in the properties of the matrix, which may be varied depending on the potential applications. For both classes of materials, pushing the temperature limits in service towards low or high values is an example of the needs for dedicated improvements.</p> <p>Advanced cast irons are innovative materials with excellent mechanical and service properties that can challenge several quenched and tempered steels for structural components, with the benefit of lower density and tremendous money saving because of near shape casting and low alloying element contents, which makes their use very attractive for components in heavy transportations like trucks, mining machinery and train systems, and in power generation as in wind turbines. Tool steels are designed to work other materials including steels but also magnesium, titanium, or even zirconium or tantalum. They must therefore show hardness, even to high temperatures up to 600°C, toughness and abrasion resistance. They are employed in most automotive, aeronautical and construction processing industries, as well as in all areas requiring mechanical machining.</p> <p>In this symposium, contributions from experimental investigations and simulations are invited, covering topics like melt control, modification and inoculation, pouring process, solidification and heat treatments, mechanical properties. Control and prediction of process-microstructure-properties relationships are key issues.</p>		