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Sommario/riassunto	<p>Nowadays, 25% of materials used are metals, and this ratio is not expected to decrease, as metals are indispensable for many applications due to their high resistance to temperature. The only handicap of metals is their relatively higher density with respect to composites. Lightening of metallic structures is possible in three ways: (i) employing low density metals, (ii) developing new ones, and (iii) increasing the yield strength of existing high-density metals. The Laboratory of Excellence of the Lorraine University in France, called 'Design of Alloy Metals for Low-Mass Structures', is working to lighten metal via metallurgical means. Two leading research laboratories compose this Laboratory of Excellence within the Lorraine University: the Laboratory of Microstructure Studies and Mechanics of Materials (LEM3), based in Metz, and the Jean Lamour Institute (IJL), located in Nancy. In this Special Issue, they report on some of their major progress in the different fields of metallurgy and mechanics of metallic materials. There are articles in the three major fields of metallurgy: physical, chemical, and mechanical metallurgy. All scales are covered, from atomistic studies to real-scale metallic structures.</p>