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Preselection of emission lines for future CF LIBS analysis of the suitable fusion devices first wall material

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CF-LIBS is a proven effective method for elemental analysis of metal alloys. EUROFER97's development began more than 25 years ago as a replacement for radiologically undesired elements like Mo, Nb, Ni and Co with their lower-activation counterparts like Ta, W, Mn, and V. The addition of about 0.2 wt% of V improves creep strength and impact behavior, whereas about 1 wt% of W can acts as strengthening element [1]. The nominal composition is approximately 0.11% C, 9.0% Cr, 1.1% W, 0.4% Mn, 0.2% V, 0.1% Ta, and 89.09% iron (Fe).
EUROFER is the European structural candidate for future fusion devices wall material. Its development included several boundary conditions such as lifetime at operational conditions at elevated temperatures and neutron irradiation, environmental and economic issues. The current EUROFER material development tries to find an optimum temperature by thermodynamically guided alloying, thermal treatment, and microstructural optimization.
This work involves a preliminary evaluation of the emission lines of the elements in the EUROFER. This preliminary evaluation consists of determining the optimal emission lines for studying the concentrations of the elements using the LIBS technique. Their selection was based on the following properties:
The lines must be inferefernce free, uneffected by other emission lines and should not be self-absorbed, which could contribute to an error. The preselection of the suitable lines of the considered elements and degree of ionization for CF-LIBS analysis is crucially important. The emission lines and their parameters were ontained from the NIST LIBS database[2].

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Pracovisko fakulty (katedra)/ Department of Faculty

Dept of Experimental Physics, FMPI, Comenius University, Mlynska dolina F2, 84248 Bratislava, Slovakia

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Author: Mr CROVO, Octavio (Dept of Experimental Physics, FMPI, Comenius University, Mlynska dolina F2, 84248 Bratislava, Slovakia)

Co-authors: Dr D'ANGELO, Cristian (National University of the Center of the Province of Buenos Aires (UNCPBA), Faculty of Exact Sciences, IFAS,Pinto 399, Tandil, Buenos Aires, Argentina.); Mr SISKOVIC, Gorazd (Dept of Experimental Physics, FMPI, Comenius University, Mlynska dolina F2, 84248 Bratislava, Slovakia); Dr PEREYRA, Mariana (National University of the Center of the Province of Buenos Aires (UNCPBA), Faculty of Exact Sciences, IFAS,Pinto 399, Tandil, Buenos Aires, Argentina.); VEIS, Pavel (Dept of Experimental Physics, FMPI, Comenius University, Mlynska dolina F2, 84248 Bratislava, Slovakia); Mr SHETTY, Sanath (Dept of Experimental Physics, FMPI, Comenius University, Mlynska dolina F2, 84248 Bratislava, Slovakia)

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