

ESTEP 2025 Annual Event

28-30 October 2025
Udine (ITALY)

How decarbonisation, digitisation
and circular solutions forge the
sustainable European steel future?

Annelies Malfliet
KULeuven
Research expert

MSCA Doctoral Network HELIOS

Using hydrogen in stainless steel production and process residue valorisation



DIGIMET



DANIEMI AUTOMATION



**UNIVERSITÀ
DEGLI STUDI
DI UDINE**
HIC SUNT FUTURA



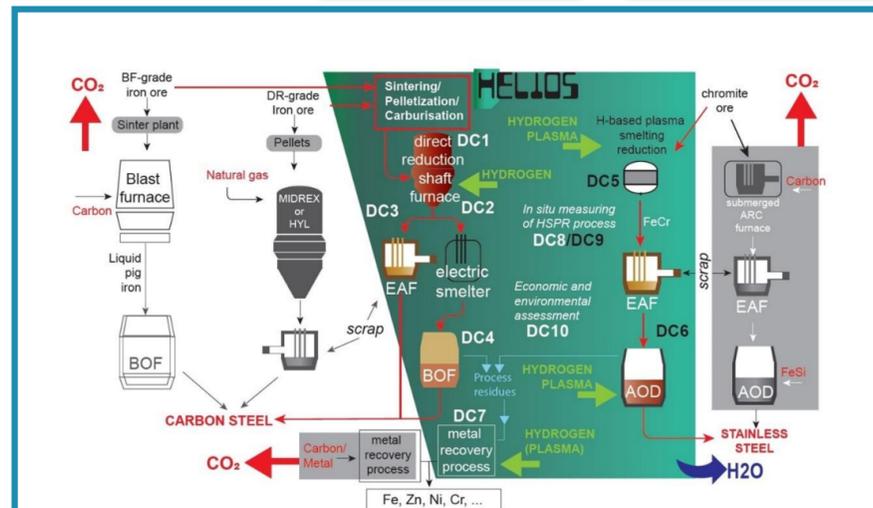
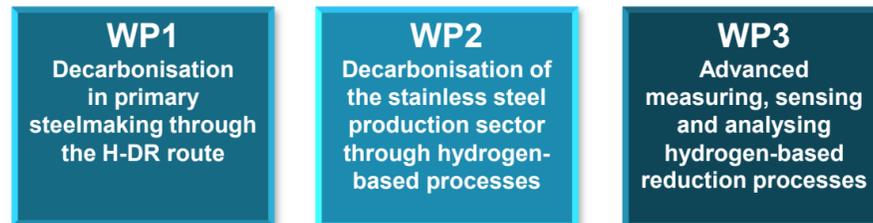
BENEFICIARIES



ASSOCIATED PARTNERS

MSCA Doctoral Network HELIOS

Adoption of Hydrogen mEtalLurgy
In the climate-neutral production Of Steel



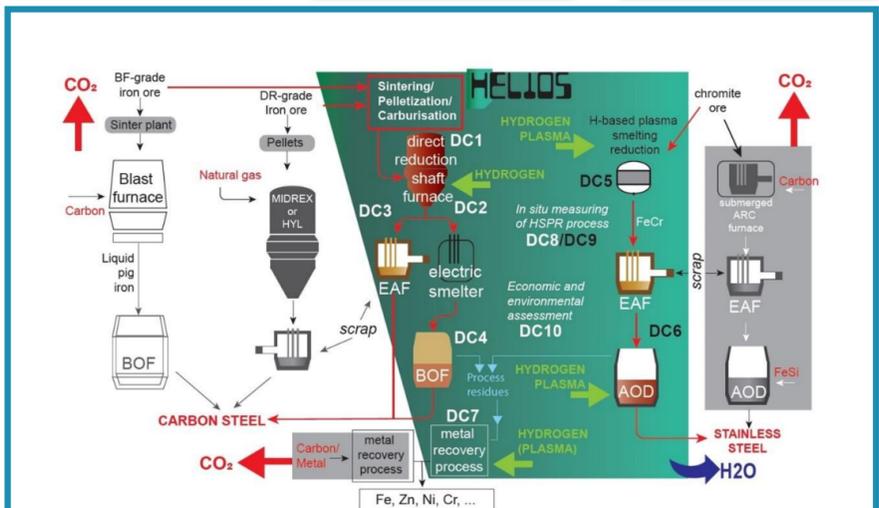
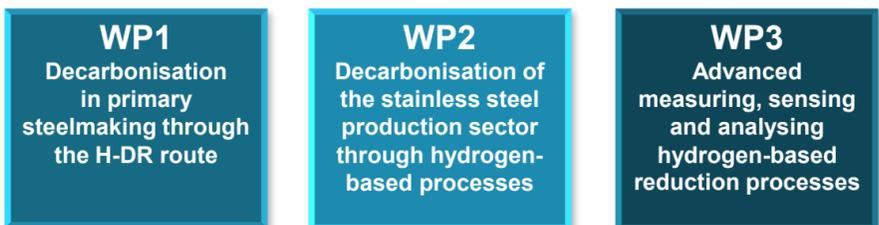
- DC1 Reduction and degradation of pellets in a hydrogen-dominated direct-reduction shaft furnace
- DC2 Carburization and melting behaviour of hydrogen-based direct reduced iron
- DC3 Future EAF steelmaking with different iron-bearing raw materials
- DC4 Future converter steelmaking based on hydrogen-reduced DRI
- DC5 Hydrogen plasma-based reduction of chromite/chromium oxide for stainless steel
- DC6 Hydrogen plasma as green alternative reductant in the Argon Oxygen Decarburization (AOD) process for stainless steel
- DC7 Metal recovery by hydrogen reduction of stainless-steel process residues
- DC8 Advanced online hydrogen measurement technologies within the hydrogen-plasma smelting reduction process
- DC9 Advanced characterisation of hydrogen plasma and the related reduction phenomena
- DC10 Sustainability and economical assessment of future steelmaking routes



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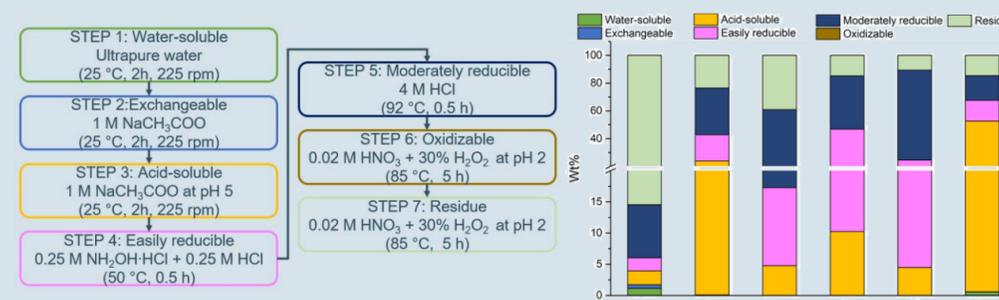
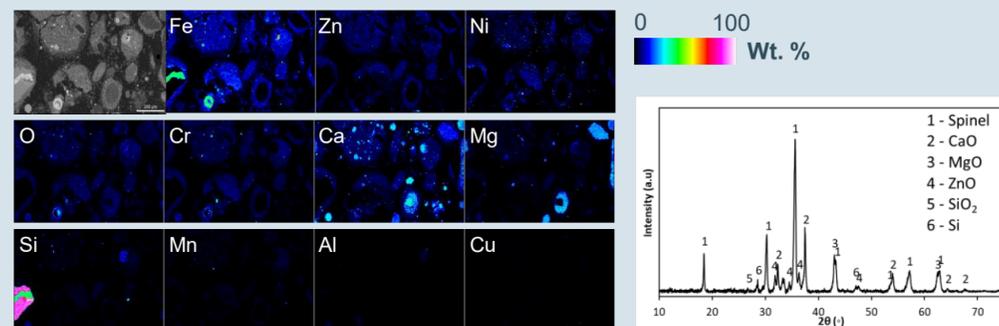


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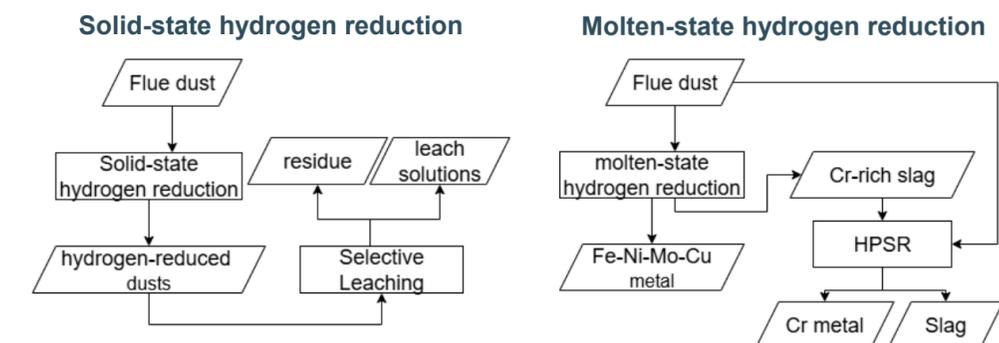
Metal recovery by hydrogen reduction of stainless-steel process residues (DC7)

Characterisation of flue dust

	Fe	Ca	Cr	Zn	Mg	Si	Ni	Mn	Na	K	Pb	Al	Cu
Wt. %	21.0	15.4	7.3	7.2	3.9	2.0	2.0	1.7	0.0	0.5	0.3	0.3	0.3



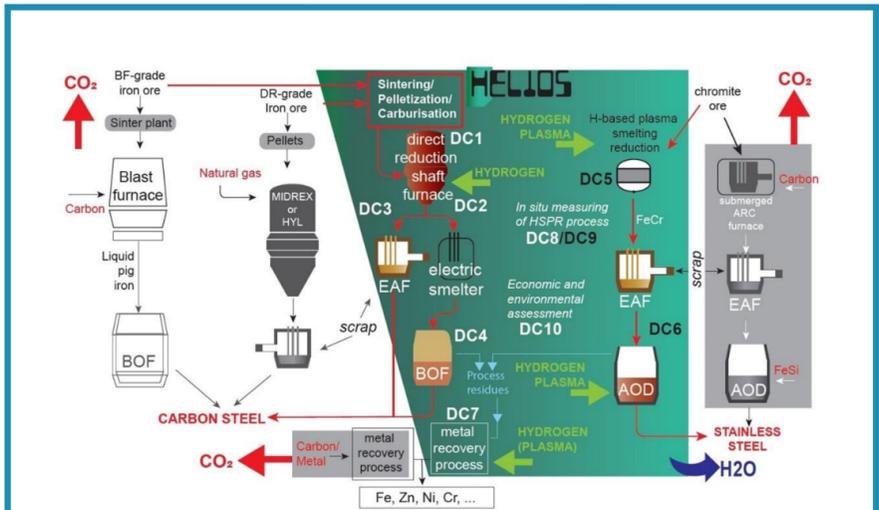
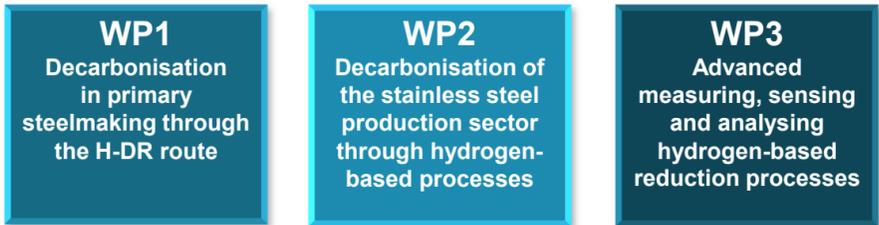
Selected metal recovery flowsheets for investigation





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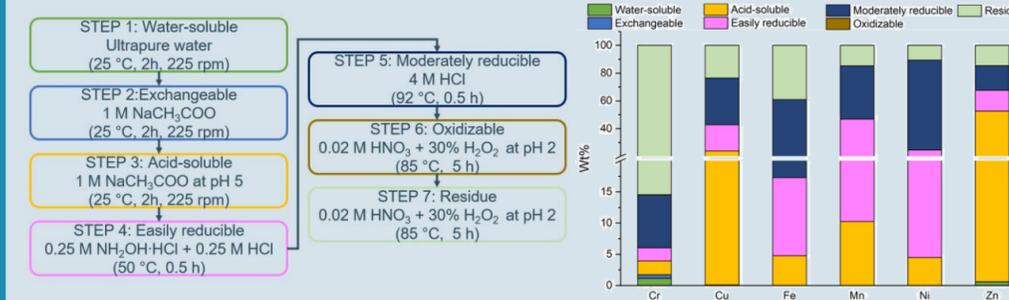
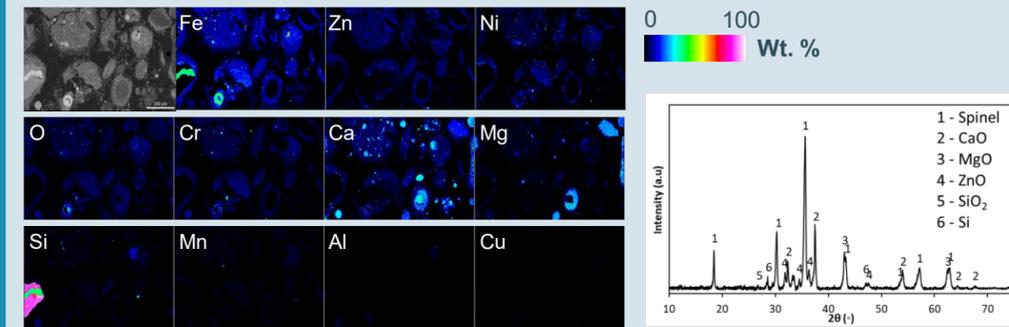


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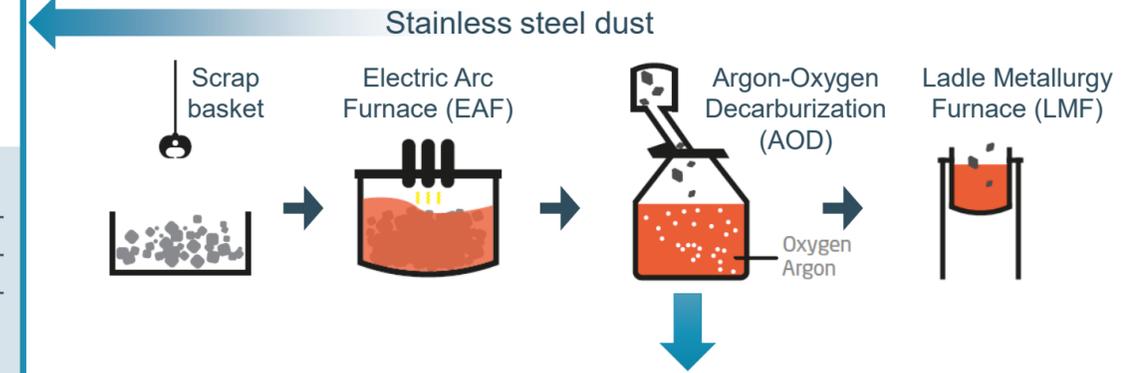
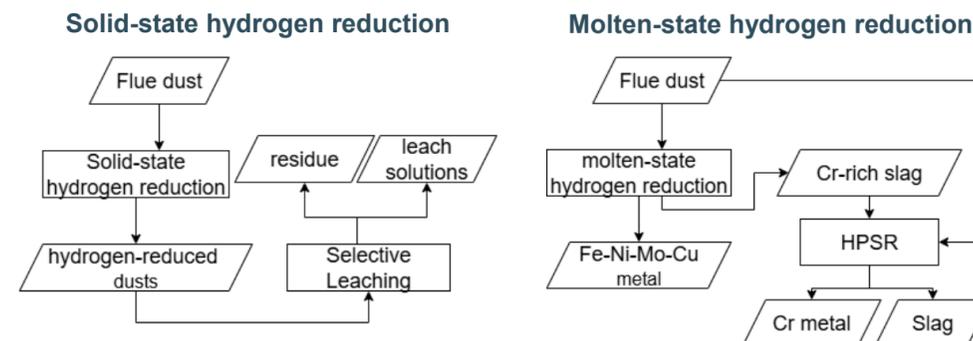
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Selected metal recovery flowsheets for investigation



Hydrogen plasma as green alternative reductant in the AOD process for stainless steel (DC6)

