



**ADMISSION TO DOCTORAL STUDIES**

**Session September 2022**

**Field of doctoral studies: Materials engineering**

**Doctoral supervisors:**

**Prof. dr. eng. Cornel SAMOILĂ**

**Prof. dr. eng. Mircea Horia ȚIEREAN**

**TOPICS FOR THE ADMISSION TO DOCTORAL STUDIES**

**TOPIC 1:** *Contributions to the reduction of iron oxide from water atomized metal powder*

**Content / Main aspects to be considered**

- *Reduction of iron oxides from atomized powder with water and different reducing agents:  $H_2$ ,  $CO+H_2$ ,  $CO$*
- *Characterization of the obtained powder*

**Recommended bibliography:**

1. Li, S.; Zhang, H.; Nie, J.; Dewil, R.; Baeyens, J.; Deng, Y. The Direct Reduction of Iron Ore with Hydrogen. *Sustainability* **2021**, *13*, 8866. <https://doi.org/10.3390/su13168866>
2. Wendel, J.; Manchili, S.K.; Hryha, E. *et al.* Oxide reduction and oxygen removal in water-atomized iron powder: a kinetic study. *J Therm Anal Calorim.* **2020**, *142*, 309–320. <https://doi.org/10.1007/s10973-020-09724-6>
3. Wendel, J.; Manchili, S.K.; Hryha, E.; Nyborg, L. Reduction of surface oxide layers on water-atomized iron and steel powder in hydrogen: Effect of alloying elements and initial powder state. *Thermochimica Acta*, **2020**, *692*, 178731, <https://doi.org/10.1016/j.tca.2020.178731>
4. Spreitzer, D.; Schenk, J. Reduction of Iron Oxides with Hydrogen—A Review. *Steel Research International*, **2019**, *90(10)*, 1900108, <https://doi.org/10.1002/srin.201900108>
5. Brinkman, L.; Bulfin, B.; Steinfeld, A. Thermochemical Hydrogen Storage via the Reversible Reduction and Oxidation of Metal Oxides, *Energy Fuels* **2021**, *35*, 18756–18767. <https://doi.org/10.1021/acs.energyfuels.1c02615>
6. Heidari, A.; Niknahad, N.; Iljana, M.; Fabritius, T. A Review on the Kinetics of Iron Ore Reduction by Hydrogen. *Materials* **2021**, *14*, 7540. <https://doi.org/10.3390/ma14247540>  
Zheng, H.; Spreitzer, D.; Wolfinger, T. *et al.* Effect of Prior Oxidation on the Reduction Behavior of Magnetite-Based Iron Ore During Hydrogen-Induced Fluidized Bed Reduction. *Metall Mater Trans B* **2021**, *52*, 1955–1971. <https://doi.org/10.1007/s11663-021-02215-5>

**Prerequisites / Remarks:** *Graduation in: Engineering, Physics, Chemistry*

**Doctoral supervisors,**

Prof. dr. eng. Cornel SAMOILĂ



**Coordinator of the field of doctoral studies,**

Prof.dr.eng. Mircea Horia ȚIEREAN



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