

## International seminar

### Hydrogen use in Process Metallurgy

Date: 15-16 May 2024, Quality Hotel Prinsen, Trondheim, Norway (Hybrid)

#### Agenda Day 1

| Speaker   | Session/ presentation   | Time (CET*) |
|---|---|-------------|
| NTNU, UToronto  | Welcome   | 08:40-09:00 |
| Session 1: Hydrogen-based iron and steelmaking I, Chair: Akbar Rhamdhani                |   |             |
| Mårten Gornerup, Metsol AB, Sweden  | hydrogen-based iron- and steelmaking from an industrial perspective   | 09:00-09:25 |
| Vincent Chevrier<br>Midrex Technologies Inc., USA                                       | Hydrogen Direct Reduction... well beyond the pilot stage  | 09:25-09:50 |
| Richard Elliot,<br>Hatch Ltd., Canada   | Hydrogen Use for Blast Furnace Ironmaking   | 09:50-10:15 |
| Coffee Break  |   | 10:15-10:45 |
| Session 2: Hydrogen use in non-ferrous metallurgical processes I, Chair: Halvor Dalaker |   |             |
| Akbar Rhamdhani,<br>Swinburne University of Technology, Australia                       | Hydrogen reduction of Pb-containing resources: kinetics and challenges  | 10:45-11:10 |
| Eli Ringdalen, SINTEF, Norway   | Hydrogen use for silicon production   | 11:10-11:35 |
| Torben Edens, Aurubis, Germany  | Hydrogen use for deoxidation of blister copper  | 11:35-12:00 |
| Lunch   |   | 12:00-13:15 |
| Session 3: Hydrogen-based iron and steelmaking II, Chair:                               |   |             |
| Jonas Dietzig; Roberto Valery, Parizat Panday<br>Metso Outotec, Germany                 | The effect of preheating on the hydrogen based direct reduction of iron ore fines                                 | 13:15-13:40 |
| Dali Hariswijaya, NTNU, Norway  | Effect of H <sub>2</sub> -H <sub>2</sub> O mixture composition on reducibility of bauxite residue pellets         | 13:40-14:05 |
| Casper van der Eijk,<br>SINTEF, Norway  | Hydrogen reduction in plasma rotary pilot furnace at SINTEF   | 14:05-14:30 |
| Yan Ma, Max-Planck-Institut für Eisenforschung (MPIE), Germany                          | Basic science behind green ironmaking with hydrogen and ammonia   | 14:30-14:55 |
| Coffee Break, Group photo   |   | 14:55-15:15 |
| Session 4: Hydrogen; production, safety, transportation, economics, Chair: Torben Edens |   |             |
| Martin Adendorff,<br>Linde, Germany   | Hydrogen safety, supply and logistics   | 15:15-15:40 |
| Nick Mittica,<br>Verdogy, Canada  | Green Hydrogen-Paving the way to a clean energy future  | 15:40-16:05 |
| Martin Adendorff,<br>Linde, Germany   | Hydrogen for oxyfuel combustion in high temperature processes, e.g., glass melting, steel reheating, Al recycling | 16:05-16:30 |
| Dinner (quality Hotel Prinsen)  |   | 19:00       |

\*Central European Time

Agenda, Day 2

| Speaker  | Session/ presentation  | Time (CET)  |
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| Opening Day 2  |  | 08:25-08:35 |
| Session 5: Hydrogen-based iron and steelmaking III, Chair: Richard Elliot              |  |             |
| Leili Tafaghodi, McMaster University, Canada   | Hydrogen-Based Direct Reduction of Iron Ore Pellets: Microstructural Evaluations and Kinetic Studies                                       | 08:35-09:00 |
| Geoffrey Brooks, Swinburne University of Technology, Australia                         | Kinetics of Hydrogen Flash Ironmaking  | 09:00-09:25 |
| Henri Pauna, University of Oulo, Finland   | H <sub>2</sub> -plasma smelting reduction - an overview of H2PlasmaRed HEU project   | 09:25-09:50 |
| Joohyun Park, Hanyang University, Korea  | Challenge and vision of electric steelmaking technology for abatement of CO <sub>2</sub> emissions with H <sub>2</sub> use in steel sector | 09:50-10:15 |
| Coffee Break   |  | 10:15       |
| Session 6: Hydrogen use in non-ferrous metallurgical processes II, Chair: Joohyun Park |  |             |
| Halvor Dalaker, SINTEF, Norway   | Manganese production with hydrogen plasma  | 10:45-11:10 |
| Dursman Mchabe and Mopeli Khama, Mintek, South Africa                                  | Evaluation of the effects of fluidization conditions on hydrogen reduction of manganese ore fines  | 11:10-11:35 |
| Alok Sarkar, NTNU, Norway  | Kinetics of hydrogen reduction of Nchwaning manganese ore in a stationary bed reactor  | 11:35-12:00 |
| NTNU, UToronto   | Closing  | 12:00-12:10 |
| Lunch  |  | 12:10-13:30 |
| Visit to NTNU & SINTEF labs  |  | 13:30-15:30 |