Advances in Electrostatic Separation controlling Surface Charging by Use of Reagents

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Content

- Montanuniversität Leoben (MUL)
- (Tribo-)electrostatic separation – a key research area at MUL
- Existing equipment applied at the Chair of Mineral Processing
- Triboelectrostatic charging unit(s) – a prerequisite for a better understanding of the charge behavior
- Novel concept as project idea
Montanuniversität Leoben (MUL)

- 4,000 students, 1,300 employees
- 10 bachelor and 12 master programmes
- 45 chairs

Main building of MUL, founded in 1840
Research Objectives

- **Main goal**
  - Enhancing the application of (tribo-)electrostatic separation in the European primary and secondary extractive industry

- **Innovative approaches**
  - Application of dry processes in areas of primary and secondary extractive industry in which up to now wet processes are applied
  - Control of charge and charge behavior by influencing environmental conditions and use of reagents
  - Rapid adjustment to changing feed conditions
  - Improvements
    - of electrostatic equipment
    - in controlled online charging behavior and process control
Challenge

- Triboelectrostatic separation is **sensitive to surface conditions** of mineral phases to be separated

- controlling of water layers on the particle surfaces

- changing surface properties of the mineral particles
1st implementation in minerals sector

Sibelco
Feldspar - Quartz

Input  Feldspar  Quartz

Heating
Charging
Electrostatic separators
Magnetic separator
Types of triboelectrostatic separators

**Belt separator**

**Free-fall separator**

Particle diameter [µm]

Montanuniversität Leoben
Chair of Mineral Processing © 2011
Types of triboelectrostatic separators

**Belt separator** and **Free-fall separator**
in the climate chamber of the Chair of Mineral Processing
1st triboelectrostatic charging device
Charging characteristic

- Higher relative humidity $\rightarrow$ Lower specific charge on Calcite
- Higher r.h. $\rightarrow$ Higher influence on charge due to electric field
- $\rightarrow$ dry atmosphere of $\sim 30\%$ r. h. needed for separation
2nd triboelectrostatic charging device
Novel Concept

- Free-fall separator
- Liberation Conditioning Charging
- Belt separator

Feed

Coarse fraction

Fine fraction

Concentrate
Gangue

Pretreatment

Concentrate
Gangue
Conclusions

- At present, wet process routines dominate beneficiation, but ...
- ... dry separation technologies will gain in importance in future
- Industry, i.e. industrial minerals sector in Europe, requests highly effective, innovative dry mineral processing technologies
- (Tribo-)electrostatic separation will become increasingly important
- Charging behavior has to be controlled – reagents are essential for a successful utilization
Thank you for your attention!

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