

Improved quantification and calorific value determination of lightweight materials with X-ray fluorescence spectroscopy

Summary

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|---------------------------------------|--|------------------------|
| Profile type | Company's country | POD reference |
| Technology offer | Germany | TODE20230329017 |
| Profile status | Type of partnership | Targeted countries |
| PUBLISHED | Commercial agreement with technical assistance Research and development cooperation agreement | • World |
| Contact Person | Term of validity | Last update |
| Annamaria DI PATRIZIO | 29 Mar 2023 28 Mar 2024 | 29 Mar 2023 |

General Information

Short summary

The new analytical method of a German university allows quantification of elements with high atomic numbers in plastics, polymers, and substitute fuels. The technology makes determination of calorific value for plastics and substitute fuels very easy, quick, and precise. Unlike established near-infrared methods, this procedure measures not only the surface, but almost the entire volume of samples and determines the energy content. The university offers a license and/or a technology agreement.

Full description

X-ray fluorescence analysis can be used to identify about 80 elements, giving it great popularity in the industrial areas of mining, refineries, and cement. Using it to analyze lightweight materials such as plastics has thus far been a challenge, since elements with low atomic numbers such as carbon, hydrogen, nitrogen, and oxygen generally do not radiate sufficient fluorescence, making it impossible to establish a sample matrix. So-called standardless methods for quantifying elements with high atomic numbers cannot be applied optimally without matrix composition information. Matrix-adjusted calibration materials are rarely available for quantitative methods.

The new analytical method of a German university allows quantification of elements with high atomic numbers in plastics, polymers, and substitute fuels. First, a multi-variant calibration is recorded and used to extract the precise matrix composition of samples and thus improve standardless quantification (see figure).

This procedure can also be used to simultaneously determine the energy content of the materials in question. The

technology makes determination of calorific value for plastics and substitute fuels very easy, quick, and precise. Unlike established near-infrared methods, this procedure measures not only the surface, but almost the entire volume of samples and determines the energy content.

The university offers a license agreement to X-ray apparatus manufacturers, energy producers or companies active in the field of recycling. If there is interest in further development of the process, the university also offers technological cooperation.

Advantages and innovations

Unlike established near-infrared methods, this procedure measures not only the surface, but almost the entire volume of samples and determines the energy content. Other advantages are:

- Combines elemental and caloric analysis
- Quickly determines energy content
- Determines elements in lightweight materials such as plastics
- Enhances analytical efficiency
- High analytical precision

Technical specification or expertise sought

Stage of development

Lab tested

IPR Status

IPR applied but not yet granted

Sustainable Development goals

• **Not relevant**

Partner Sought

Expected role of the partner

The university offers a license agreement to X-ray apparatus manufacturers, energy producers or companies active in the field of recycling. If there is interest in further development of the process, the university also offers technological cooperation.

Type of partnership

Type and size of the partner

Commercial agreement with technical assistance

Research and development cooperation agreement

• **SME 50 - 249**

• **SME <=10**

• **Other**

• **SME 11-49**

• **Big company**

Dissemination

Technology keywords

- **10003004 - Recycling, Recovery**
- **10001006 - Protection against intoxication**
- **10001004 - Hazardous Materials**
- **10002013 - Clean Production / Green Technologies**

Targeted countries

- **World**

Market keywords

- **08004004 - Other pollution and recycling related**
- **06007001 - Other energy production**
- **05002001 - X-rays**

Sector groups involved