



EU TRAINING NETWORK FOR RESOURCE RECOVERY THROUGH ENHANCED LANDFILL MINING

European Training Network for Resource Recovery Through Enhanced Landfill Mining (NEW-MINE)

D6.1 First paper by ESR1-15



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Public

Authors:

[All ESRs;

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Introduction

The European Training Network for Resource Recovery Through Enhanced Landfill Mining (NEW-MINE) is laying the foundations for a resource- and environmentally driven ELFM industry in the EU, through the development of innovative concepts, technologies and methods for integrated resource recovery and remediation of landfills containing municipal solid waste (MSW). More specifically, ELFM refers to the value-chain of exploring, excavating, separating, treating, recovering and upcycling landfilled materials and energy resources as well as reclaiming the land that the landfills currently occupy.

The NEW-MINE project kicked off in September 2016 and unites a team of 15 young, enthusiastic PhD researchers across the E.U. working on resource recovery through enhanced landfill mining. Every six months, the full consortium gathers during a Network-Wide Event (NWE) in which the Early Stage Researchers (ESRs) present their results of the past months. Feedback is provided by (co-)supervisors, partners and peers, and the perspectives towards the future are discussed. Furthermore, during these NWEs, the ESRs discuss the academic work (conference posters, presentations, and journal papers).

Below an overview is given of all publications per ESR until August 22, 2019. It should be considered that the different ESRs have a different starting date of their individual PhDs and therefore have progressed to different levels. All final publications are open access and available in online open repositories; they are also listed on the project website under 'Communications' – 'Science communication': new-mine.eu/communications/science-communication/

14 of the 15 ESRs have published at least 1 paper. One ESR, ESR7 – Katarzyna Janusz (KTH), has no publications yet, as she joined the project only recently, on January 19, 2019.



Overview publications

ESR1 - Christin Bobe (UGent) - Modelling the landfill subsurface through integration of multi-sensor geophysical data, WP1

Journal papers published

Hanssens, Daan, Delefortrie, S., Bobe, C., Hermans, T., and De Smedt, P. (2019). Improving the reliability of soil EC-mapping: robust apparent electrical conductivity (rECa) estimation in ground-based frequency domain electromagnetics. *GEODERMA*, 337, 1155â€“1163.

Delefortrie, S., Hanssens, D., Saey, T., Van De Vijver, E., Smeyrns, M., Bobe, C., and De Smedt, P. (2019). Validating land-based FDEM data and derived conductivity maps: Assessment of signal calibration, signal attenuation and the impact of heterogeneity. *Journal of Applied Geophysics*, 164, 179-190.

Journal papers submitted

Bobe, C., Van De Vijver, E., De Smedt, P., Hanssens, D., and Van Meirvenne, M. Probabilistic inversion of frequency-domain electromagnetic data using a Kalman ensemble generator. Submitted for publication in *IEEE Transactions on Geoscience and Remote Sensing*.

Vollprecht, D., Bobe, C., Stiegler, R., Van De Vijver, E., Wolfsberger, T., Küppers, B., Scholger, R. Magnetic properties of municipal solid waste constituents – Implications for enhanced landfill mining and iron content. Submitted for publication in *Detritus*.

Conference papers published

Bobe, C., and Van De Vijver, E. (2019). Offset errors in probabilistic inversion of small-loop frequency-domain electromagnetic data: a synthetic study on their influence on magnetic susceptibility estimation, International workshop on Gravity, Electrics and Magnetics 2019, Xi'an, China.

Bobe, C., Van De Vijver, E., and Van Meirvenne, M. (2018). Exploring the potential of electromagnetic surface measurements for the characterization of industrial landfills. In *Proceedings of the 4th international symposium on enhanced landfill mining*, pages 45–50. KU Leuven. Sustainable Inorganic Materials Management; i-Cleantech.

Abstracts

Bobe, C., Hanssens, D., De Smedt, P., and Van De Vijver, E. (2019). Efficient probabilistic joint inversion using a Kalman ensemble generator. Abstract 581766-S017, 2019 Fall Meeting, AGU, San Francisco, Calif., 9.-13. Dec.

Bobe, C., Van De Vijver, E., and Van Meirvenne, M. (2019). Proposing a statistical interpretation for the depth of investigation. *GEOPHYSICAL RESEARCH ABSTRACTS* (Vol. 21). Presented at the EGU General Assembly 2019.

Bobe, C., Van De Vijver, E., and Van Meirvenne, M. (2019). Improving geophysical resource exploration using probabilistic inversion methods. *COMMUNICATIONS IN AGRICULTURAL AND APPLIED BIOLOGICAL SCIENCES* (Vol. 84, pp. 9-9). Presented at the 24th National symposium for Applied Biological Sciences (NSABS 2019).



Bobe, C., Van De Vijver, E., De Smedt, P., Hanssens, D., and Van Meirvenne, M. (2018). Bayesian inversion of loop-loop electromagnetic data using an ensemble Kalman method. In GEOPHYSICAL RESEARCH ABSTRACTS, volume 20.

ESR2 - Cristina Gloria García Lopez (RWTH Aachen) - Validation and expansion of the geophysical model by mechanical processing (RWTH), WP1

Journal papers published

C. García López, B. Küppers, J.C. Hernández Parrodi, A. Clausen, T. Pretz. "Landfill mining: A case study on sampling, processing and characterization of excavated waste from an Austrian landfill". Detritus Journal, Volume 02, June 2018. DOI [10.31025/2611-4135/2018.13664](https://doi.org/10.31025/2611-4135/2018.13664)

C. García López, A. Ni, J.C. Hernández Parrodi, B. Küppers, K. Raulf and T. Pretz, "Characterization of landfill mining material after ballistic separation to evaluate material and energy recovery potential". Detritus Journal, Special Issue: Enhanced Landfill mining, September 2019. DOI [10.31025/2611-4135/2019.13780](https://doi.org/10.31025/2611-4135/2019.13780)

Journal papers accepted

I. Nuran Zaini, C. García López, Thomas Pretz, Weihong Yang, Pär Göran Jönsson, "Characterization of pyrolysis products of high-ash excavated-waste and its char gasification reactivity and kinetics under steam atmosphere". Waste Management and Research Journal (2019).

Journal papers submitted

H. Lucas, J. C. Hernández Parrodi, C. García López, D. Vollprecht, K. Raulf, R. Pomberger, T. Pretz and B. Friedrich, "Assessment of the recovery of non-ferrous metals in landfill mining. A case study of a landfill in Belgium". Detritus Journal, Special Issue: Enhanced Landfill mining.

B. Küppers, J.C. Hernández Parrodi C. García López, D. Vollprecht and R. Pomberger, "Potential of Sensor-Based Sorting in Enhanced Landfill Mining". Detritus Journal, Special Issue: Enhanced Landfill mining.

J.C. Parrodi, C. García López, B. Küppers, K. Raulf, D. Vollprecht, T. Pretz and R. Pomberger, "Case study on enhanced landfill mining at Mont-Saint-Guibert landfill in Belgium: Characterization and potential of fine fractions". Detritus Journal, Special Issue: Enhanced Landfill mining.

Conference papers published

C. García López, B. Küppers, K. Raulf, T. Pretz, D. Vollprecht, R. Pomberger, "Applicability of Sensor-Based Sorting to Landfill Mining Material" At the World Congress ISWA (Bilbao, Spain), October 2019.

I. Nuran Zaini, C. García López, Y. Gómez Rueda, T. Pretz, L. Helsen, P. Göran Jönsson and W. Yang, "Gasification of refuse derived fuel obtained from a ballistic separation process of landfill waste". At the 17th International waste management and landfill Symposium (Sardinia, Italy), October 2019.

H. Lucas, C. Li, C. García López, J. C. Hernández Parrodi, D. Gürsel, B. Friedrich, T. Pretz and H. Wotruba, "Primary evaluation of the use and refining of Al scrap recovered from a landfill in Belgium". At the European Metallurgical Conference (Düsseldorf, Germany), June 2019.



J.C. Parrodi, C. García López, B. Küppers, D. Vollprecht and R. Pomberger. "Characterization of Fine Fractions from Landfill Mining - A Case Study of a Landfill Site in Belgium". At Recy and DepoTech 2018 (Leoben, Austria), November 2018.

C. García López, A. Ni, J.C. Parrodi Hernández, B. Küppers, A. Clausen and T. Pretz. "Characterization of landfill mining material after ballistic separation to evaluate material and energy recovery". At the Urban Mining Symposium (Bergamo, Italy), May 2018.

C. García López, A. Clausen and T. Pretz. "Potential of the ballistic separator Type STT6000 as a first step for the recovery of RDF from old landfill material: A case study at Mont Saint Guibert Landfill (Belgium)". At the 4th Enhanced Landfill Mining Symposium (Mechelen, Belgium), February 2018.

A. Clausen, C. García López, M. Kriipsalu and T. Pretz, "MSW management in Estonia: The current situation and future potential for energy recovery from sustainable sources". At the International Symposium on MBT and MRF (Hannover, Germany), May 2017.

B. Küppers, C. García López, D. Vollprecht, A. Clausen and R. Pomberger. "Das "EU Training Network for Resource Recovery through Enhanced Landfill Mining" (NEW-MINE)". At the 7. Wissenschaftskongress "Abfall- und Ressourcenwirtschaft" (Aachen, Germany), March 2017.

Posters

"The potential of the ballistic separator type STT6000 as a first step for the recovery of RDF from old landfill material: A case study at Mont-Saint-Guibert landfill (Belgium)". 4th International Symposium on ELF, Mechelen (Belgium), 2018.

"Landfilled material composition at the landfill site in Halbenrain, Austria". At the 5th International Conference on Sustainable Solid Waste Management, Athens (Greece), 2017.

ESR3 - Bastian Küppers (MULEoben) - Modelling and validation of sensor-based sorting technologies of intergrown and surface-defiled waste, WP1

Journal papers published

Characterization of landfill mining material after ballistic separation to evaluate material and energy recovery potential, Cristina García López, Anita Ni, Juan Carlos Hernández Parrodi, Thomas Pretz, Karoline Raulf, Bastian Küppers, Available online in Detritus - In Press, DOI 10.31025/2611-4135/2019.13780

Landfill mining: A case study regarding sampling, processing and characterization of excavated waste from an Austrian landfill, Cristina García López, Bastian Küppers, Adele Clausen, Thomas Pretz, Available online in Detritus - Volume 02 / June 2018 Pages 29-45, DOI 10.31025/2611-4135/2018.13664

Influence of surface roughness and surface moisture of plastics on sensor-based sorting in the near infrared range, Bastian Küppers, Sabine Schloegl, Gernot Oreski, Roland Pomberger, Daniel Vollprecht, WM&R, DOI: 10.1177/0734242X19855433



Influences and consequences of mechanical delabelling on pet recycling, Bastian Küppers, Xiaozheng Chen, Irina Seidler, Karl Friedrich, Karoline Raulf, Thomas Pretz, Alexander Feil, Roland Pomberger, Daniel Vollprecht, Available online in Detritus, DOI: 10.31025/2611-4135/2019.13816

ESR4 - Juan Carlos Hernandez Parrodi (Renewi) - Production of Refuse Derived Fuel from presently inappropriate waste fractions, WP1

Journal papers published

J.C. Hernández Parrodi, D. Höllen, R. Pomberger, Characterization of fine fractions from landfill mining: A review of previous investigations, *Detritus - Multidisciplinary Journal for Waste Resources & Residues*, 2, 42-62 (2018). DOI [10.31025/2611-4135/2018.13663](https://doi.org/10.31025/2611-4135/2018.13663)

J.C. Hernández Parrodi, D. Höllen, R. Pomberger, Potential and main technological challenges for material and energy recovery from fine fractions of landfill mining: A critical review, *Detritus - Multidisciplinary Journal for Waste Resources & Residues*, 3, 19-29 (2018). DOI [10.31025/2611-4135/2018.13689](https://doi.org/10.31025/2611-4135/2018.13689)

Journal papers submitted

J.C. Hernández Parrodi, C. García López, B. Küppers, K. Raulf, D. Vollprecht, T. Pretz, R. Pomberger, Case study on enhanced landfill mining at Mont-Saint-Guibert landfill in Belgium: Characterization and potential of fine fractions, Submitted to *Detritus - Multidisciplinary Journal for Waste Resources & Residues*, Special Issue on Resource Recovery through Enhanced Landfill Mining.

Conference papers published

J.C. Hernández Parrodi, D. Höllen, R. Pomberger, *Characterization of fine fractions from landfill mining: a review of previous landfill mining investigations*, Proceedings of the 16th International Waste Management and Landfill Symposium (Sardinia 2017), Cagliari (Italy), 2-6 October 2017.

J.C. Hernández Parrodi, D. Höllen, R. Pomberger, *Fine fractions from landfill mining: Potential and main challenges to overcome*, Proceedings of the 4th International Symposium on Enhanced Landfill Mining (ELFM IV), Mechelen (Belgium), 5-6 February 2018.

J.C. Hernández Parrodi, C. García López, K. Raulf, B. Küppers, D. Höllen, R. Pomberger, *Characterization of fine fractions from landfill mining – A case study of a landfill site in Belgium*, Proceedings of Recy & DepoTech, Leoben (Austria), 7-9 November 2018.

J.C. Hernández Parrodi, K. Raulf, D. Vollprecht, T. Pretz, R. Pomberger, Mechanical processing of fine fractions from landfill mining for material and energy recovery, Proceedings of the 17th International Waste Management and Landfill Symposium (Sardinia 2019), Cagliari (Italy), 30 September-4 October 2019.

J.C. Hernández Parrodi, H. Lucas, M. Gigantino, G. Sauve, J.L. Esguerra, P. Einhäupl, Strategies for landfill mining – Integrating resource recovery into current waste management, Workshop at the 17th International Waste Management and Landfill Symposium (Sardinia 2019), Cagliari (Italy), 30 September-4 October 2019.



ESR5 - Ilman Nuran Zaini (KTH) - Sustainable Municipal Solid Waste treatment by a steam plasma gasification, WP2

Journal papers published

Ilman Nuran Zaini, Weihong Yang, Pär Göran Jönsson, *Steam gasification of solid recovered fuel char derived from landfill waste: A kinetic study*, Energy Procedia, Volume 142, 2017, Pages 723-729, ISSN 1876-6102, <https://doi.org/10.1016/j.egypro.2017.12.118>.

Ilman Nuran Zaini, Cristina García López, Thomas Pretz, Weihong Yang, Pär Göran Jönsson, *Characterization of pyrolysis products of high-ash excavated-waste and its char gasification reactivity and kinetics under a steam atmosphere*, Waste Management, Volume 97, 2019, Pages 149-163, ISSN 0956-053X, <https://doi.org/10.1016/j.wasman.2019.08.001>.

Conference papers published

Ilman Nuran Zaini, Weihong Yang, Pär Göran Jönsson, *Pyrolysis of solid recovered fuel from landfill waste: Gas and oil product composition*, 4th International Symposium on Enhanced Landfill Mining, Mechelen (Belgium), 5-6 February 2018.

Conference papers submitted

Ilman Nuran Zaini, Cristina García López, Thomas Pretz, Weihong Yang, Pär Göran Jönsson, *Gasification of refuse derived fuel obtained from a ballistic separation process of landfill waste*, 17th International Waste Management and Landfill Symposium, Cagliari (Sardinia, Italy), 30 Sept - 4 Oct 2019.

Ilman Nuran Zaini, Weihong Yang, Pär Göran Jönsson, *Energy and material recovery through plasma gasification of landfill waste*, Circular Materials Conference 2018, Gothenburg (Sweden), 7 – 8 March 2018. (Conference abstract)

ESR6 - Yamid Gomez Rueda (KU Leuven) - Syngas purification by plasma tar cracking, WP2

Journal papers published

Rueda, Y. G., & Helsen, L. (2019). The role of plasma in syngas tar cracking. *Biomass Conversion and Biorefinery*. <https://doi.org/10.1007/s13399-019-00461-x>. Status: Published Online.

Journal papers submitted

Gomez Rueda Y., Helsen L. (Submitted on August 1st 2019). *Pyrolysis and steam reforming of naphthalene and toluene as tar surrogates*. Status: Submitted to Detritus Journal.

Conference papers published

Gomez Rueda, Y., Nuran Zaini, I., Yang, W., & Helsen, L. (2019). *Landfill solid waste-based syngas purification by a hybrid pulsed corona plasma unit*. 27th European Biomass Conference and Exhibition, 27-30 May 2019, Lisbon, Portugal, 520–522. <https://doi.org/10.5071/27thEUBCE2019->



[2BO.6.2](#). Status: Published Online

Rueda, Y. G., Helsen, L. (2019). The use of a nanosecond-pulsed corona plasma for tar-cracking at high temperatures : first insights. 2–4. <https://www.ispc-conference.org/ispcproc/ispc24/493.pdf>. Status: Published Online

Gomez Rueda Y., Helsen L. Agon N.(2018). Cold plasmas for gaseous pollutant control as a benchmark for their use in tar abatement in syngas. https://kuleuven.sim2.be/wp-content/uploads/2018/02/ELFM-IV_Symposium_Book_FEB_2018.pdf. Status: Published

Conference papers submitted

Gomez Rueda Y., Helsen L. (Accepted oral presentation). The effect of carbon dioxide and steam on the cracking of naphthalene as tar surrogate. Sardinia Conference 2019. Status: Accepted Oral Presentation

ESR7 – Katarzyna Janusz (KTH) - Solar-driven thermochemical conversion of RDF – Thermodynamic/kinetic analyses and heat/mass transfer modelling, WP2

Started on January 18, 2019. No publications yet.

ESR8 - Marco Gigantino (ETH Zürich) - Solar-driven thermochemical conversion of RDF – Solar reactor development, WP2

Journal papers published

M. Gigantino, D. Kiwic, A. Steinfeld, Thermochemical energy storage via isothermal carbonation-calcination cycles of MgO-stabilized SrO in the range of 1000 - 1100 °C, Solar Energy, 2019, 188, 720-729 <https://doi.org/10.1016/j.solener.2019.06.046>

Conference abstracts

M. Gigantino, Z. Jovanovic, A. Steinfeld, Integration of concentrated solar energy into continuous gasification of refuse-derived fuel, Presented at 13th SOLLAB Doctoral Colloquium on Solar Concentrating Technologies, Berlin (Germany), 15-17 May 2017

M. Gigantino, Z. Jovanovic, A. Steinfeld, Thermochemical heat storage development for 24/7 solar-driven gasification of refuse-derived fuel, Proceedings of the 4th International Symposium on Enhanced Landfill Mining (ELFM IV), 2018, 211-212

M. Gigantino, A. Steinfeld, Development of Reversible-Reacting Materials for High-Temperature Thermochemical Heat Storage of Concentrated Solar Energy, Presented at 13th ASME International Conference on Energy Sustainability, Bellevue (USA), 14-17 July 2019

M. Gigantino, A. Steinfeld, High-temperature thermochemical heat storage: development of materials and lab-scale packed-bed prototype, To be presented at SFERA III – 1st Doctoral Colloquium, Font-Romeu-Odeillo-Via (France), 11-13 September 2019



M. Gigantino, A. Steinfeld, Thermochemical energy storage materials for high-temperature concentrated solar energy, To be presented at 12th European Congress of Chemical Engineering (ECCE 12), Florence (Italy), 15-19 September 2019

ESR9 - Hugo Lucas (RWTH Aachen)- Hollow electric arc conditioning of slags from thermochemical

Journal papers submitted

H. Lucas et al., 'Quality assessment of nonferrous metals in landfill mining. A case study in Belgium', Detritus, 2019.

P. Rabelo Monich, F. Dogrul, H. Lucas, B. Friedrich, and E. Bernardo, 'Strong porous glass-ceramics from alkali activation and sinter-crystallization of vitrified MSWI bottom ash', Detritus, 2019.

P. Rabelo Monich, R. E. Murillo Alarcón, H. Lucas, B. Friedrich, Y. Pontikes, and E. Bernardo, 'Upcycling of conditioned MSWI bottom ash into porous ceramics by means of strong or weak alkali activation', Detritus, 2019

Conference papers published

H. Lucas and B. Friedrich, 'Metallurgical concepts for recycling of bottom ashes from municipal waste incinerators', presented at the 4th International Symposium on Enhanced Landfill Mining, Mechelen, Belgium, 2018, vol. Upcycling technologies for Enhanced Landfill Mining, pp. 277–284.

H. Lucas, P. R. Monich, G. Sauve, B. Friedrich, E. Bernardo, and K. Van Acker, 'Sustainable Approach to Valorise Ashes from MSWI', presented at the Recy & DepoTech 2018, Leoben, Austria, 2018, vol. 14, pp. 637–644.

H. Lucas and B. Friedrich, 'Thermodynamics of conditioning MSWI Bottom Ash using SAF for usage in minerals products', presented at the Slag valorisation symposium, Mechelen, Belgium, 2019, vol. Slag valorisation and thermodynamics, pp. 57–60.

P. Rabelo Monich, H. Lucas, B. Friedrich, and E. Bernardo, 'Porous glass-ceramics from alkali activation and sinter-crystallisation of vitrified bottom ash', presented at the Slag valorisation symposium, Mechelen, Belgium, 2019, vol. Slag valorisation as ceramics and insulation materials, pp. 221–224.

G. Sauve, H. Lucas, P. Rabelo Monich, E. Bernardo, B. Friedrich, and K. Van Acker, 'Life cycle assessment of novel technical routes to valorise MSWI bottom ash', presented at the Slag valorisation symposium, Mechelen, Belgium, 2019, vol. Slag valorisation as ceramics and insulation materials, pp. 221–224.

H. Lucas, G. Alkan, Buhle Xakalashé, and B. Friedrich, 'Conditioning of Bauxite Residue with Bottom Ash in view of recovery of valuable metals: A sustainable approach', presented at the 2nd Int. Bauxite Residue Valorisation and Best Practices, Athens, Greece, 2018.



H. Lucas *et al.*, 'Primary evaluation of the use and refining of Al scrap recovered from a landfill in Belgium Primary evaluation of the use and refining of Al scrap recovered from a landfill in Belgium', presented at the EMC, Dusseldorf, Germany, 2019, vol. 1, pp. 51–61.

Conference papers submitted

P. Rabelo Monich, H. Lucas, B. Friedrich, M. Segata, A. Morbi, and E. Bernardo, 'Upcycling of vitrified residues by alkali activation and sinter-crystallization', presented at the 17th International waste management and landfill symposium, Sardinia, Italy, 2019, p. 2019.

J. C. Hernandez Parrodi, H. Lucas, M. Gigantino, G. Sauve, L. Esguerra, and P. Einhäupl, 'Strategies for Landfill Mining – Integrating resource recovery into waste management', presented at the 17th International waste management and landfill symposium, Sardinia, Italy, 2019, p. 2019.

Conference abstracts

P. Rabelo Monich, H. Lucas, B. Friedrich, and E. Bernardo, 'High strength cellular glass-ceramics from glass by-products of metal extraction processes applied on MSWI bottom ash', presented at the Material Science and Technology Conference 2018, Ohio, USA, 2018.

P. Rabelo Monich, R. E. Murillo Alarcón, H. Lucas, B. Friedrich, Y. Pontikes, and E. Bernardo, 'Upcycling of conditioned MSWI bottom ash into porous ceramics by means of strong or weak alkali activation', presented at the XVI ECerS conference, Turin, Italy, 2019.

ESR10 - Georgia Flesoura (KU Leuven) - Novel mechanical and electro-thermal techniques for the conditioning of slags from thermochemical conversion technologies, WP3

Journal papers accepted

G. Flesoura, B. Banos, J. Civera, J. Vleugels, Y. Pontikes In-situ measurements of high-temperature dielectric properties of municipal solid waste incinerator bottom ash, *Ceramics International* xx, xxxx (2019).

Conference papers published

G.Flesoura, B.Garcia-Banos, J.M.Catala-Civera, J.Vleugels, Y.Pontikes, Dielectric Properties Measurements of Municipal Solid Waste Incinerator Bottom Ash at High, *Proceedings of the 4th Enhanced Landfill Mining Symposium (ELFM 2018)*, Mechelen (Belgium), 05-06 February 2018, 299-304.

G.Flesoura, A.Peys, J.Vleugels, Y.Pontikes, Alkali Activation of Synthetic SiO₂-CaO-FeO_x-Al₂O₃-MgO glass, *6th International Slag Valorisation Symposium*, Mechelen (Belgium), 01-05 April 2019,



Conference abstracts

G.Flesoura, B.Garcia-Banos, J.M.Catala-Civera, J.Vleugels, Y.Pontikes, Dielectric Properties of Olivine Group Minerals, 17th International Conference on Microwave and High Frequency Heating, 09-12 September 2019, Valencia, Spain.

G.Flesoura, B.Garcia-Banos, J.M.Catala-Civera, J.Vleugels, Y.Pontikes, Microwave Process Development of the Municipal Solid Waste Incinerator Bottom Ash, Materials Science & Technology 2018, Columbus (Ohio, USA), 06 November 2018.

ESR11 - Guilherme Ascensão (Italcementi) - Responsive inorganic polymers being reusable and recyclable for near-zero energy dwellings, WP3

Journal papers submitted

Ascensão, G., Marchi, M., Segata, M., Faleschini, F., & Pontikes, Y. (20??). Reaction kinetics and structural analysis of alkali activated Fe-Si-Ca rich materials. *Journal of cleaner production*, xx, xxx.

Ascensão, G., Marchi, M., Segata, M., Faleschini, F., & Pontikes, Y. (20??). Increasing the dimensional stability of CaO-FeOx-Al₂O₃-SiO₂ alkali-activated materials: on the swelling potential of calcium oxide-rich admixtures. *Detritus*, xx, xxx.

Conference papers published

G. Ascensão et al., The effect of CaO-rich admixtures on controlling drying shrinkage of alkali activated materials, *6th International Slag Valorization Symposium*, Mechelen (Belgium), 1-5 April, 2019.

G. Ascensão et al., Influence of microstructure on mechanical strength of alkali activated Fe-Si-Ca rich materials, *4th Enhanced Landfill Mining Symposium (ELFM 2018)*, Mechelen (Belgium), 5-7 February, 2018, 285-290.

ESR12 - Patricia Rabelo Monich (University of Padova) - Waste-derived glass-ceramic products with novel functionalities, WP3

Journal papers published

P. Rabelo Monich, D. Vollprecht, E. Bernardo, Dense glass-ceramics by fast sinter-crystallization of mixtures of waste-derived glasses, *International Journal of Applied Ceramic Technology* (2019). DOI: 10.1111/ijac.13332

P. Rabelo Monich, D. Desideri, E. Bernardo, Low temperature upcycling of vitreous byproduct of the MSW plasma processing into multifunctional porous glass-ceramics, *Advances in Applied Ceramics*, 118, 366-371 (2019). DOI: 10.1080/17436753.2019.1595265

P. Rabelo Monich, A. Rincon Romero, D. Höllen, E. Bernardo, Porous glass-ceramics from alkali activation and sinter-crystallization of mixtures of waste glass and residues from plasma processing of municipal solid waste, *Journal of Cleaner Production*, 188, 871-878 (2018). DOI: 10.1016/j.jclepro.2018.03.167



Journal papers submitted

P. Rabelo Monich, F. Dogrul, H. Lucas, B. Friedrich, E. Bernardo, Strong porous glass-ceramics from alkali activation and sinter-crystallization of vitrified MSWI bottom ash. The paper was submitted to Detritus and it was accepted on 23/07/2019.

P. Rabelo Monich, A. Rincon Romero, D. Desideri, E. Bernardo, Waste-derived Glass-Ceramics Fired in Nitrogen: Stabilization and Functionalization. The paper was submitted to Construction and Building Materials.

Conference papers published

P. Rabelo Monich, H. Lucas, B. Friedrich, M. Segata, A. Morbi, E. Bernardo, Upcycling of vitrified residues by alkali activation and sinter-crystallization, 17th International Waste Management and Landfill Symposium, Cagliari (Italy), 30 September-04 October 2019.

P. Rabelo Monich, H. Lucas, B. Friedrich, E. Bernardo, Porous glass-ceramics from alkali activation and sinter-crystallisation of vitrified bottom ash, 6th International Slag Valorisation Symposium, Mechelen (Belgium), 01-05 April 2019.

G. Sauve, H. Lucas, P. Rabelo Monich, E. Bernardo, B. Friedrich, K. Van Acker, Life cycle assessment of novel technical routes to valorise MSWI bottom ash, 6th International Slag Valorisation Symposium, Mechelen (Belgium), 01-05 April 2019.

H. Lucas, B. Friedrich, P. R. Monich, E. Bernardo, G. Sauve, K. Van Acker, Sustainable Approach to Valorise Ashes from MSWI, Recy & DepoTech 2018, Leoben (Austria), 07-09 November 2018.

P. Rabelo Monich, D. Höllen, E. Bernardo, Development and characterisation of dense waste-derived glass-ceramics, Proceedings of the 4th Enhanced Landfill Mining Symposium (ELFM 2018), Mechelen (Belgium), 5-6 February 2018, 291-298.

A. Rincon Romero, P. Rabelo Monich, E. Bernardo, Recycling of inorganic waste in monolithic and cellular glass-based materials for structural and functional applications, Proceedings of the 4th Enhanced Landfill Mining Symposium (ELFM 2018), Mechelen (Belgium), 5-6 February 2018, 255-270.

Conferences abstracts

P. Rabelo Monich, R.E. Murillo Alarcón, H. Lucas, B. Friedrich, Y. Pontikes, E. Bernardo, Upcycling of conditioned MSWI bottom ash into porous ceramics by means of strong or weak alkali activation, XVI ECerS Conference, Turin (Italy), 16-20 June 2019.

P. Rabelo Monich, H. Lucas, B. Friedrich, E. Bernardo, High strength cellular glass-ceramics from glass by-products of metal extraction processes applied on MSWI bottom ash, Materials Science and Technology 2018 Technical Meeting and Exhibition (MS&T18), Columbus (USA), 14-18 October 2018.

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ESR13 - Giovanna Sauve (KU Leuven) - Integrated LCA and RA methodology for environmental assessment of ELFM, WP4

Submitted Journal papers

Sauve G., Van Acker K., The environmental impacts of landfills in Europe: defining proper reference cases to support decision making, Journal of Environmental Management.

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ESR14 - John Laurence Esguerra (Linköping University) - Techno-Economic and Multi-Criteria Assessments of ELFM concepts and technologies, WP4

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ESR15 - Paul Einhäupl (KU Leuven) - Policy and market interventions for facilitating ELMF implementation, WP4

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