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The recycling of air pollution control residue into geopolymers via plasma arc technology

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Air pollution control residue (APCr) is a major hazardous product produced during incineration processes. The material is produced during the cleaning of the gaseous stream produced during incineration removing hazardous chemicals such as chlorine, lead and zinc before it is emitted to the atmosphere. The increase in incineration activities means that APCr production is currently around 300,000 tonnes per year in the UK alone. Thermal plasma technology can be used to vitrify this material and transform it into a non-hazardous glass suitable for commercial use for example as a low grade aggregate. Due to the vitreous nature of the material, it has been found that this material has latent hydraulic properties and can also undergo alkali activation and so form a geopolymer material which could be used as a cement substitute in concrete applications. The recycling of APCr into a material with a high economic value, such as a cement substitute, offers both economic and environmental benefits for the sustainable treatment of this hazardous waste using thermal plasma technology. The geopolymers produced from this material can achieve compressive strengths of over 70 MPa displaying properties which are competitive to commercially available cements.

Biography

Peter Keeley is an Engineering Doctorate student at the University of Birmingham under the supervision of Professor Neil Rowson. He is based at Tetronics International in Swindon, UK where he is working on developing high value products from thermal plasma processing of waste materials. He obtained a Master's of Engineering at the University of Birmingham in 2013.

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