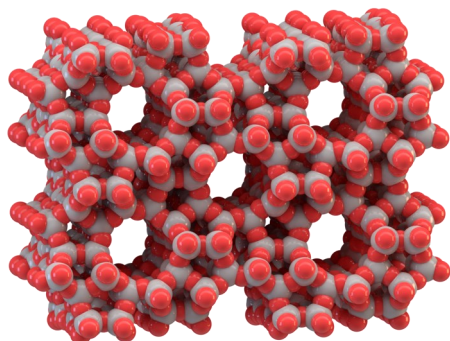


Zeolite Formulations from Fly Ash



Novel formulations for the production of zeolites using lower energy requirements and a low cost, waste raw material, Fly Ash.

Field of invention

The Environmental and Nano Science (ENS) group at the University of the Western Cape (UWC) led by Prof. Leslie Petrik has developed proprietary formulations for the synthesis of high purity zeolite phases from coal fly ash.

Technology Description

Fly ash, is a waste by product from the coal-fired electricity generating stations. Power stations need to dispose of the fly ash in a safe and environmentally friendly manner, making the need to utilize fly ash important. The production of zeolites is one way to benefit the fly ash waste where the extracted silica from coal fly ash is the feedstock needed to synthesis different zeolites. The ENS team have developed formulations for a range of low value and high value zeolites that include:

- Sodalite (demonstrated at 30L scale)
- Zeolite A (demonstrated at 500mL scale)
- ZSM5 (demonstrated at 30L scale)
- Beta (demonstrated at 10mL scale)
- Mordenite (demonstrated at 10m L scale)
- MCM (demonstrated at 10mL scale)

In addition to the low energy inputs, no additional silica, aluminium or other chelating agents are required resulting in cost effective formulations for zeolite production. This is particularly noted in our process for the production of our ZSM-5 and sodalite via low temperature leaching, a departure from the conventional high-temperature fusion methods. A preliminary techno economic study shows that producing multiple zeolites with minimal to solid waste is feasible.

Zeolite Applications

Zeolites find applications as catalysts in hydrocarbon processing, gas separation and in biodiesel production. They are also used as adsorbents and in ion-exchange processes. Zeolites are also used in slow-release fertilisers.

Commercialisation Opportunity

Technology is available for licensing.

Intellectual Property status

Patents:

- Synthesis of Zeolite X with hierarchical morphology from fly ash:- Granted in South Africa
- Process for production of high silica content zeolite from fly ash:- Granted in the United States of America and South Africa

Know-how:

Intricate knowledge and expertise on process methods and improvements at demonstrated scales.



Technology Brief

Zeolites

Inventor:



[Professor Leslie Petrik](#)

Stage of Development:

Technology Readiness Level 5

Features and benefits

- Low-cost raw material;
- Use for Fly Ash waste;
- Energy inputs are greatly reduced;
- Production Time decreases from days to hours
- Different pore size and morphology
- Active micropore and mesopore structure

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Key words

Zeolites, Fly Ash, Waste beneficiation, Environmentally friendly