Ceramic filter candle and refractory materials

for utilisation in allothermal fluidised bed gasification

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Modern gasification power generation systems are an efficiently and ecologically working alternative to conventional power generation systems. Especially for the utilisation of renewable, green fuels it is a next generation technology. One of the most efficient gasification technologies is the *Fast Internally Circulating Fluidised Bed Gasification* in Güssing (Austria).

Gasification is not common practice for the utilisation of renewable fuels since now because of its high costs, the poor gas quality, and the absence of reliably working refractories. The aggressive water vapour- and alkali-rich process environment of circulating fluidised bed gasification causes corrosion of several gasification components. Therefore, it is very important to find materials, especially refractories, reliably working in a gasifier.

Furthermore, the corrosion and fouling of downstream components needs to be prevented, and the improvement of the gas quality, just as an increase of efficiency, needs to be achieved. All these aspects can be guaranteed by the employment of a hot gas filtration system. However, the hot gas filter materials are exposed to the aggressive process environment as well. For this reason, it is also important to find a reliably working filter candle material.

In the present work the corrosion behaviour of several ceramic refractories and filter candle materials in a gasifier-like water vapour- and alkali-rich process environment was investigated. The conditions during exposures were similar to those of the circulating fluidised bed gasification in Güssing. Moreover, the influence of sulphur and chloride species in the atmosphere, as well as the influence of several ashes (wood chip ash from Güssing, straw ash, miscanthus ash, DDGS ash and lignite ash) was investigated. The corroded samples were analysed by XRD, SEM and EDX. Further investigations were done by molecular beam mass spectrometry. Finally, suitable materials have been found for refractories and filter candles.