

### Green process for synthesizing polybenzimidazoles

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A new, environmentally friendly process for the synthesis of polybenzimidazoles has been developed. The underlying technique, hydrothermal polymerization (HTP), is inspired by natural mineral formation processes in hot subterranean aquifers in the Earth's crust. HTP only requires high-temperature water and the desired monomers. Neither organic catalysts nor solvents are necessary.

#### REFERENCE:

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#### POTENTIAL APPLICATIONS:

Protective gear (e.g. firefighters) / Membrane technology / Aeronautics / Sports equipment / Aerospace

#### KEYWORDS:

high-performance polymers | polybenzimidazoles | hydrothermal polymerization | green synthesis

#### IPR:

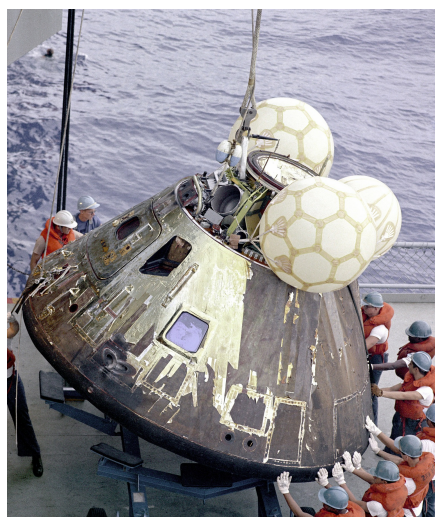
Patent pending

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#### BACKGROUND

Polybenzimidazoles (PBIs) are high-performance polymers characterized by high thermal stability, flame resistance, high resilience and rigidity even at increased temperatures, and important chemical resistance. Therefore, PBIs find application in e.g. protective gear such as firefighter and space suits, as membrane material, or in fuel cells. Unfortunately, until now the outstanding properties of PBIs came at the high cost of a toxic and environmentally detrimental production process.



#### TECHNOLOGY

The newly developed method to generate PBIs, hydrothermal polymerization (HTP), is inspired by the geological mineral formation process. The classical production processes for PBI involve very high temperatures, and either the use of harmful solvents or the discharge of toxic phenols. In contrast, HTP does not involve toxic solvents or byproducts, but uses solely high-temperature water and the desired monomers. Moreover, parameters such as morphology, thermal stability and processability of hydrothermally synthesized PBI can be fine-tuned by selection of the respective process parameters.

#### BENEFITS

- Green production process without the need for harmful solvents or the discharge of toxic byproducts.
- Applicable to a wide range of monomers.
- Morphology, thermal stability and processability can be customized by fine-tuning the HTP conditions.

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