The aim of this work is the fabrication and study of 3YTZP composites reinforced with GNPs. Composite powder was prepared by wet powder mixing and pressureless sintered in argon flow at temperatures between 1200–1500 ºC.The effects of GNP content and processing conditions on the densification, microstructure, hardness and electrical conductivity of the composites were analysed and discussed.

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Organically-modified ceramic membranes for solvent nanofiltration

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Highlights

1. An overview of different grafting techniques will be presented.
2. A variety of polymers can be attached onto the pore surface of ceramic membranes.

Separation of solvents by membranes is a potential key enabling technique for many chemical processes. State-of-the art polymeric or ceramic membranes do not always meet stability and/or selectivity demands at process-relevant conditions like separation/purification of harsh organic solvents and operations at high temperatures or pressures. In order to fulfil these operational requirements a concept is developed, based on mesoporous (pore size 5–10 nm) ceramic membranes, as a non-swelling and non-compactable, rigid material, acting as a support, on which polymer materials are immobilized; i.e. covalently or electrostatically bonded. In this way the pore size and surface chemistry of membranes can be adjusted for any specific separation application by varying the composition/structure of the polymer.

This functionalization of ceramic membranes is viable through grafting. Grafting is a process in which a specific organic substance is chemically bonded to an inorganic substrate. The OH-groups of the oxide ceramic surface will react with the hydrolysable groups of the to-be grafted organic moiety to produce a stable bond, resulting in a permanent modification of ceramic membranes.

An overview will be presented of the different grafting techniques, summarized in Fig. 1. Some performance results will be given as well.

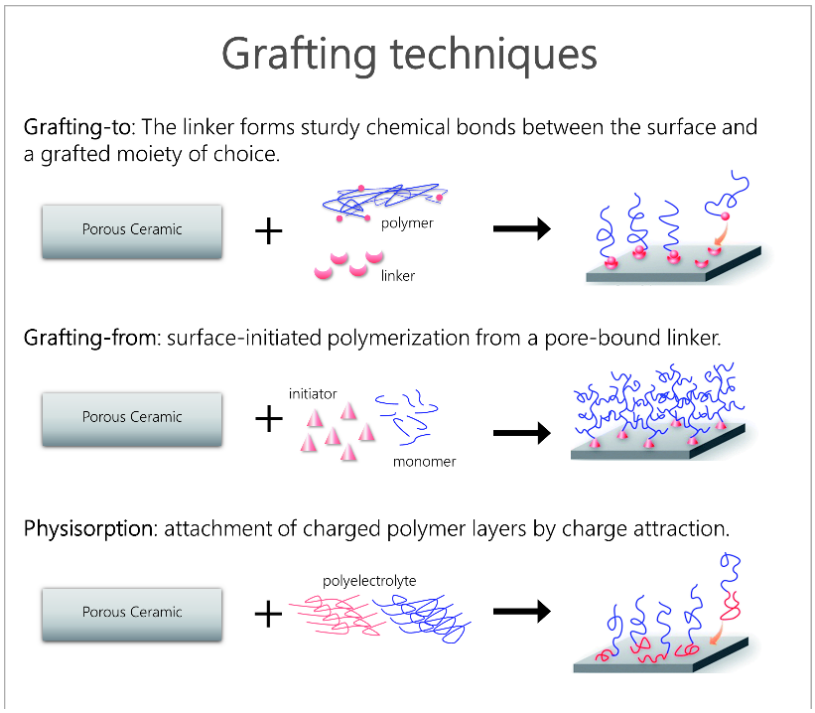

Fig. 1. Three ways of grafting

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