

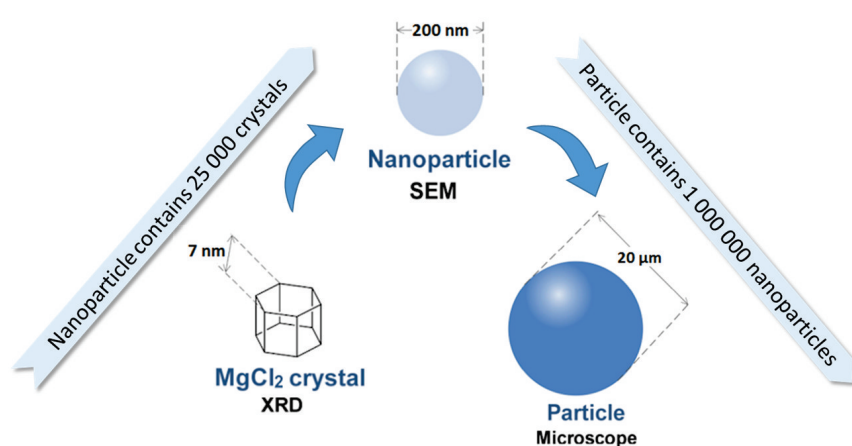
ZIEGLER-NATTA CATALYST ALTERATION DURING SYNTHESIS

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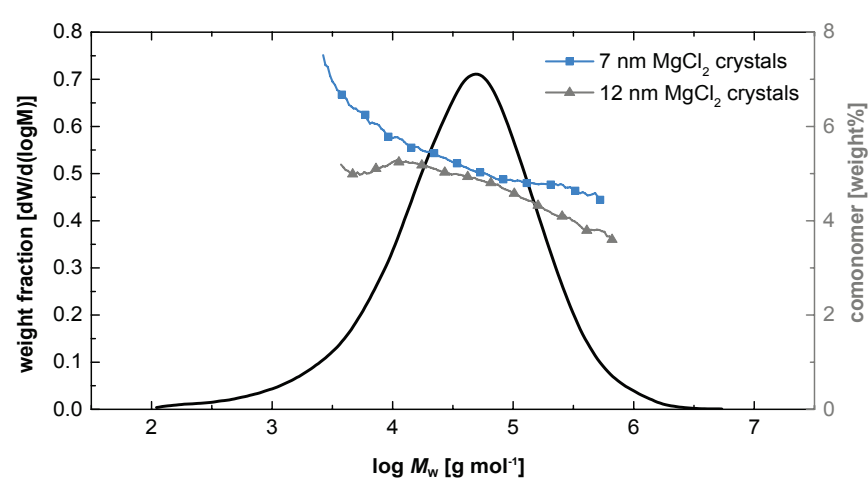
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The scope of this work was to investigate the effect of variations in catalyst synthesis on polymerization activity and comonomer incorporation. Therefore the $MgCl_2$ crystal size, the wash up procedure and the heat treatment during titaniation was varied.

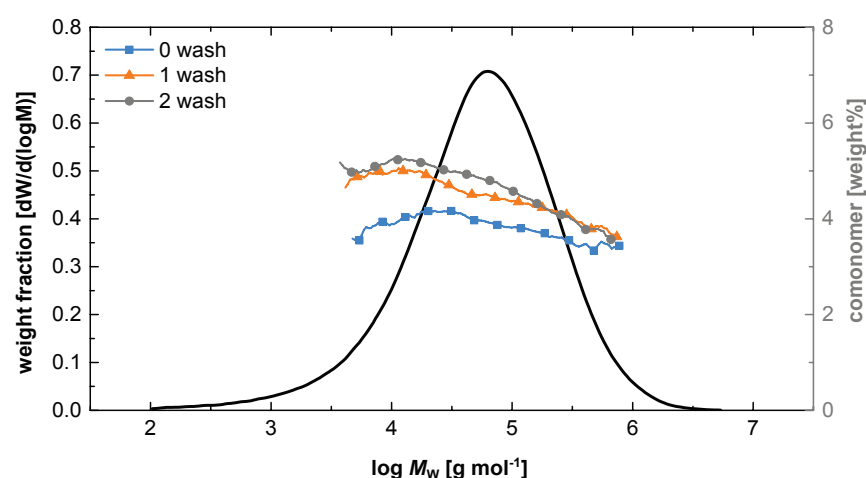
Catalyst synthesis (summary):

- mixing of butyl-octyl-magnesium solution (BOMAG) with 2-ethyl-1-hexanol at 20 °C
- Addition of $EtAlCl_2$ at 60 °C (various concentration)
- workup with heptane/centrifuging
- addition of $TiCl_4$ to support at (various temperatures)
- workup with heptane/centrifuging/vacuum drying

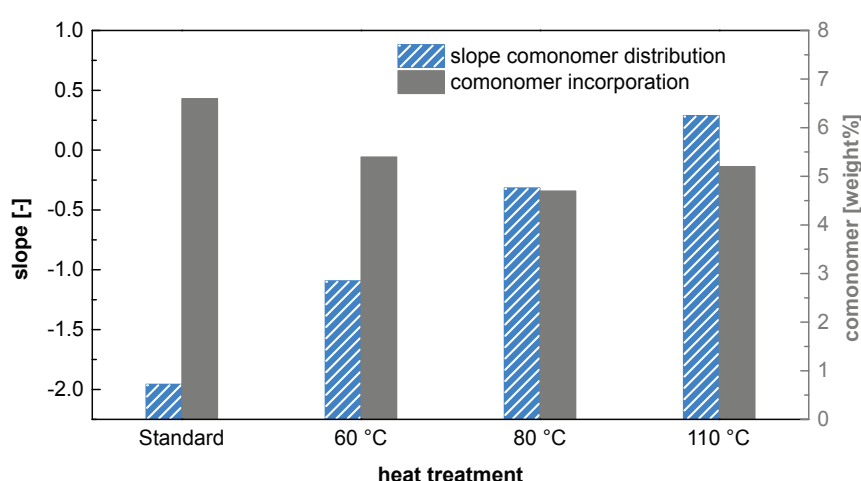


Crystal size of the $MgCl_2$ carrier was varied from 7 to 12 nm. This resulted in a difference in polymerization activity of 20 %. There was hardly any effect on comonomer incorporation

Variation of catalyst washing resulted in a change in comonomer incorporation. The maximum difference in comonomer incorporation due to washing was 25 %. Increased removal of $EtAlCl_2$ through washing leads to higher 1-butene incorporation especially at low molecular weight.



Heat treatment of the catalyst resulted in a distinct difference in comonomer incorporation. The trend for the 1-butene incorporation graph changes consecutively with increasing temperature. The effect similar is but more pronounced than observed through the washing. The incorporation can be controlled with the temperature. When looking at the polymerization activity there was no notable difference between the synthesized catalysts.



The linear regression for each 1-butene incorporation curve is compared. Simultaneous the average 1-butene incorporation in the polymer powder is shown for their respective heat treatment. A standard ZN catalyst has been added to demonstrate the difference. While the average 1-butene incorporation slightly decreases, the homogeneity increases. Further investigations showed that a minimum of 60 °C is necessary to activate this behavior. Another important factor is the duration of the heat treatment.

