# Supporting Information

## Short Time Dynamics of PDMS-g-PDMS Bottlebrush Polymer Melts Investigated by Quasi-Elastic Neutron Scattering

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***Intermediate scattering function, $S(Q,t)$, as a function of time, t, for the sample with $M_n^{side\ chain} = 298$ g/mol at low temperatures***

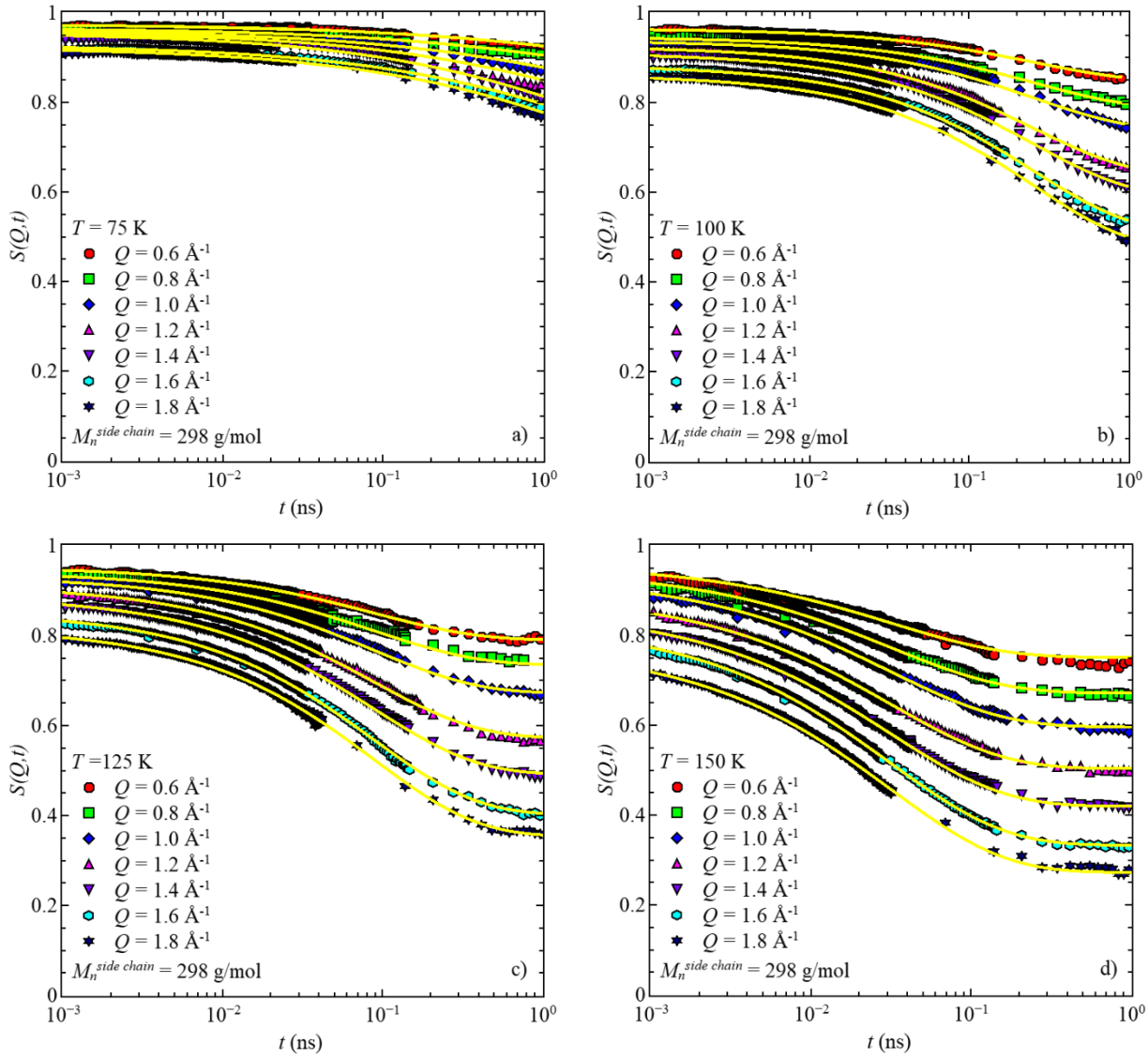


Figure S1: Intermediate scattering function, $S(Q,t)$, vs. time, $t$, for the sample with $M_n^{side\ chain} = 298$ g/mol for four different temperatures. a) $T = 75$ K, b) $T = 100$ K, c) $T = 125$ K, and d) $T = 150$ K. Solid lines represent the data description with the model function for low temperatures, equation (3).

***Intermediate scattering function, $S(Q,t)$, as a function of time, t, for the sample with $M_n^{side\ chain} = 298$ g/mol at high temperatures***

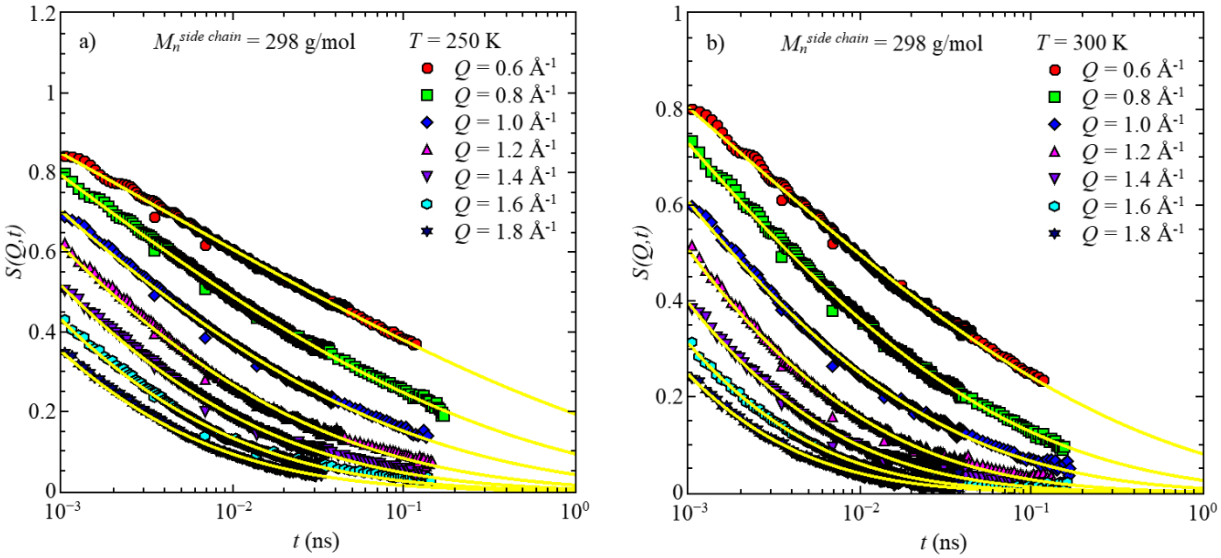


Figure S2: Intermediate scattering function, $S(Q,t)$, vs. time, $t$, for the sample with $M_n^{side\ chain} = 298$ g/mol for two temperatures, a) $T = 250$ K and b) $T = 300$ K. Solid lines represent the data description with the model function for high temperatures, equation (5).

***Intermediate scattering function, $S(Q,t)$, as a function of time, t, for the sample with $M_n^{side\ chain} = 1800$ g/mol at low temperatures***

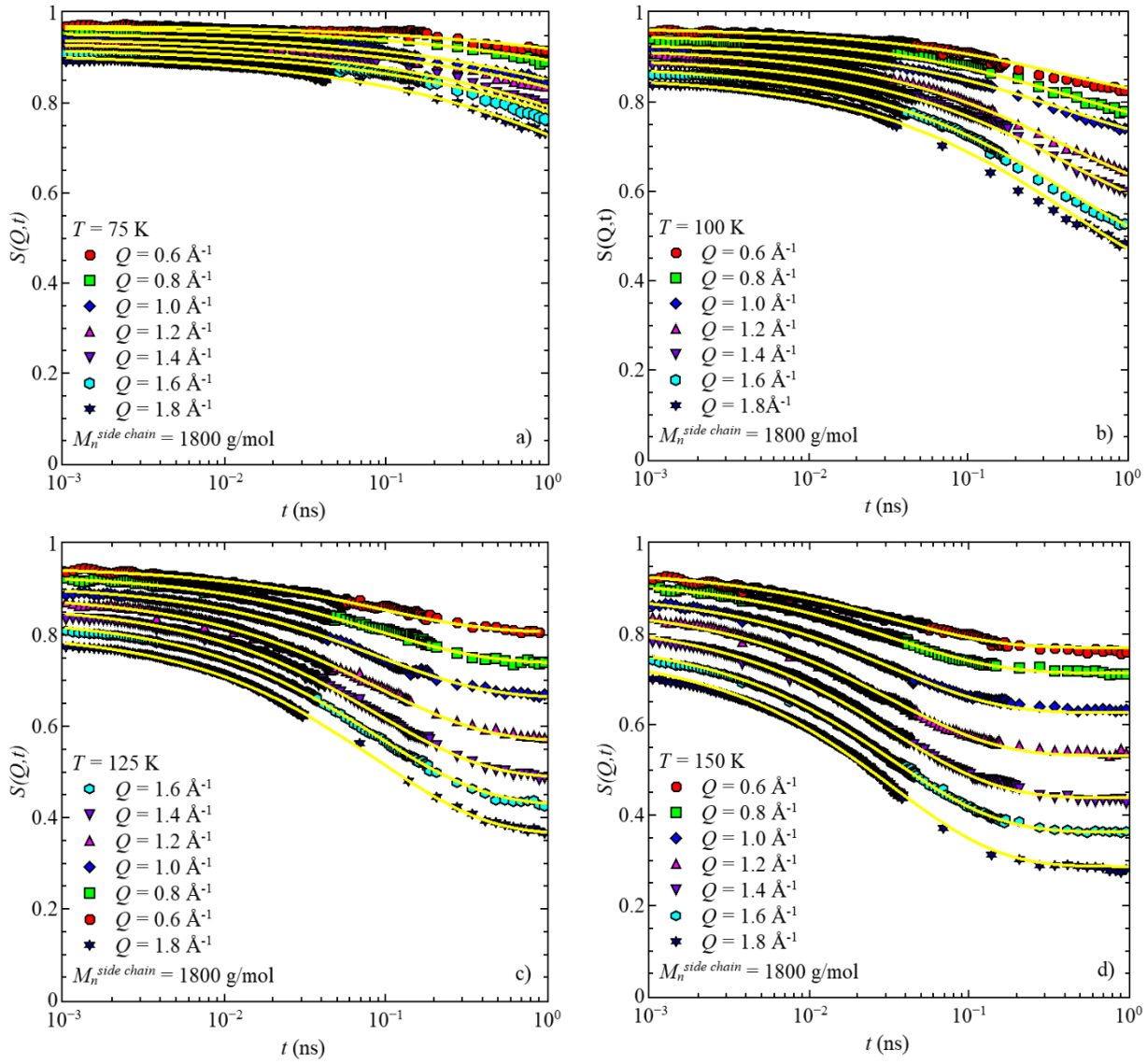


Figure S3: Intermediate scattering function, $S(Q,t)$, vs. time, $t$, for the sample with $M_n^{side\ chain} = 1800$ g/mol for four different temperatures. a) $T = 75$ K, b) $T = 100$ K, c) $T = 125$ K, and d) $T = 175$ K. Solid lines represent the data description with the model function for low temperatures, equation (3).

***Intermediate scattering function, $S(Q,t)$, as a function of time, t, for the sample with $M_n^{side\ chain} = 1800$ g/mol at high temperatures***

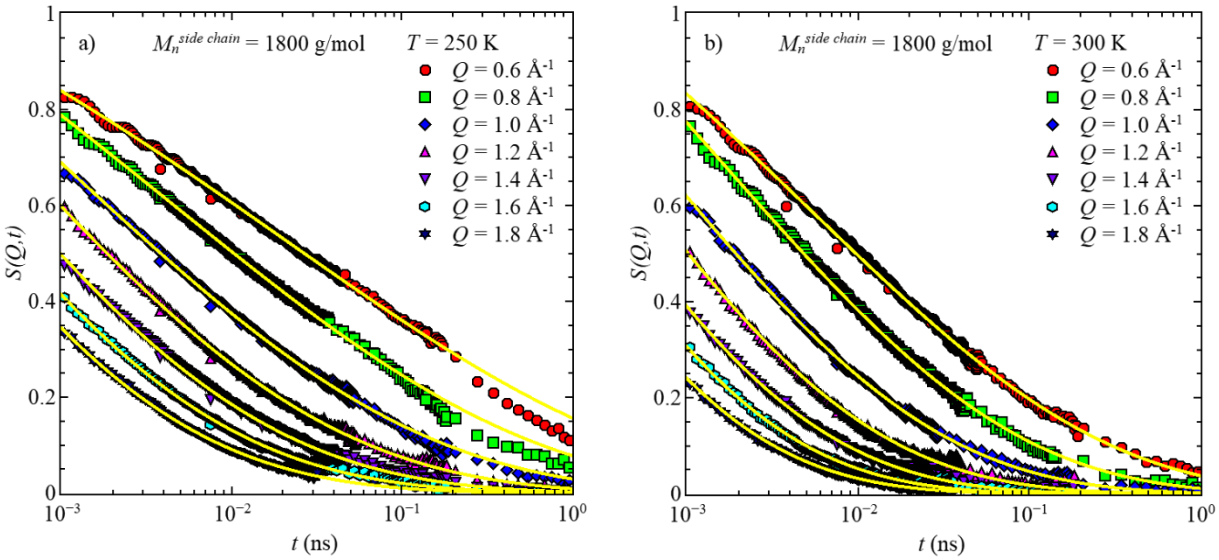


Figure S4: Intermediate scattering function, $S(Q,t)$, vs. time, $t$, for the sample with $M_n^{side\ chain} = 1800$ g/mol for two temperatures, a) $T = 250$ K and b) $T = 300$ K. Solid lines represent the data description with the model function for high temperatures, equation (5).

***Elastic incoherent structure factor, EISF, as a function of momentum transfer, Q***

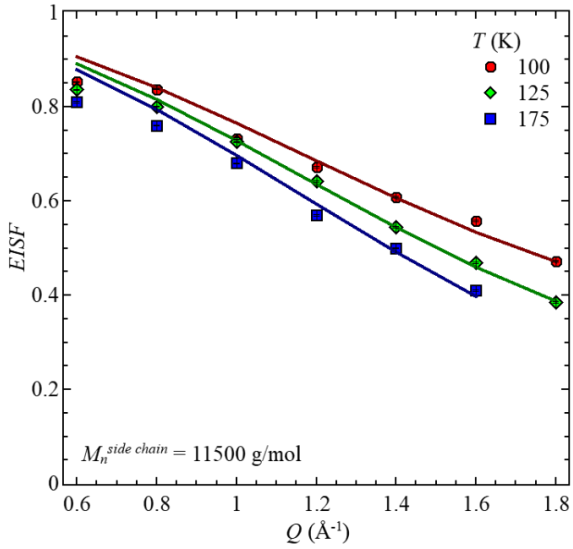


Figure S5: Elastic incoherent structure factor, $EISF$, vs. momentum transfer, $Q$, for three selected temperatures, $T = 100$ K, $T = 125$ K, and $T = 175$ K for the PDMS-g-PDMS bottlebrush polymer with $M_n^{side\ chain} = 11500$ g/mol as an example for all three samples. Solid lines are the best description with the equation (7).

***Stretching parameter, $\beta_\ell$, as a function of temperature, T***

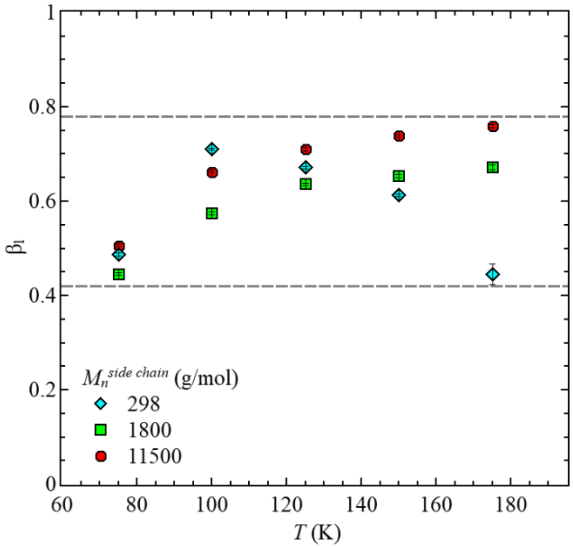


Figure S6: Stretching parameter, $\beta_\ell$, vs. temperature, $T$, for the methyl group dynamics.