**Table S9**. SBM Parameters used to obtain curve fit for fixed Q=8 and fixed Tm values.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Definition** | **Oxidized Graphite** | **Graphene Nanoplatelets** | **Reduced Graphene Nanoplatelets** | **Graphene Nanoribbons** |
|  | Zero-field splitting energy (ZFS) | 1.0x1018 | 1.80x1019 | 1.0x1018 | 1.0x1018 |
|  | Manganese-Hydrogen Bond Radius | 3.79x10-10 | 3.87x10-10 | 3.90x10-10 | 2.79x10-10 |
|  | Hydration number | 8 | 8 | 8 | 8 |
|  | Tumbling time of complex | 2.07x10-9 | 2.21x10-9 | 2.79x10-9 | 1.0x10-8 |
|  | Correlation time for splitting | 1.0x10-12 | 6.93x10-12 | 1.0x10-12 | 1.0x10-12 |
|  | Residence time of inner sphere water molecules | 1.42x10-7 | 1.29x10-7 | 1.06x10-7 | 5.06x10-7 |