**Table S6**. SBM Parameters obtained from the curve fit for fixed Q=4 and remaining SBM parameters allowed to float.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Definition** | **Oxidized Graphite** | **Graphene Nanoplatelets** | **Reduced Graphene Nanoplatelets** | **Graphene Nanoribbons** |
|  | Zero-field splitting energy (ZFS) | 1.0x1018 | 1.0x1018 | 1.0x1018 | 1.0x1018 |
|  | Manganese-Hydrogen Bond Radius | 3.37x10-10 | 3.13x10-10 | 3.51x10-10 | 2.47x10-10 |
|  | Hydration number | 4 | 4 | 4 | 4 |
|  | Tumbling time of complex | 2.21x10-9 | 1.48x10-9 | 3.57x10-9 | 4.83x10-9 |
|  | Correlation time for splitting | 1.0x10-12 | 1.0x10-12 | 1.99x10-12 | 1.0x10-12 |
|  | Residence time of inner sphere water molecules | 8.69x10-8 | 6.76x10-7 | 8.54x10-9 | 8.23x10-10 |