**Table S8**. SBM Parameters obtained from the curve fit for fixed Q=8 and remaining SBM parameters allowed to float.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Definition** | **Oxidized Graphite** | **Graphene Nanoplatelets** | **Reduced Graphene Nanoplatelets** | **Graphene Nanoribbons** |
|  | Zero-field splitting energy (ZFS) | 1.0x1048 | 6.12x1018 | 1.0x1018 | 1.0x1018 |
|  | Manganese-Hydrogen Bond Radius | 3.76x10-10 | 3.73x10-10 | 3.94x10-10 | 3.26x10-10 |
|  | Hydration number | 8 | 8 | 8 | 8 |
|  | Tumbling time of complex | 1.95x10-9 | 1.77x10-9 | 3.85x10-9 | 3.69x10-9 |
|  | Correlation time for splitting | 1.18x10-12 | 1.09x10-11 | 1.99x10-12 | 1.0x10-12 |
|  | Residence time of inner sphere water molecules | 1.42x10-7 | 7.29x10-7 | 7.06x10-9 | 5.06x10-9 |