

POLYETHERSULFONE/3-
AMINOPROPYLTRIMETHOXYSILOXANE/SILICA
COMPOSITE HOLLOW FIBER MEMBRANE
FOR SYNTHETIC OIL-IN-WATER
EMULSION SEPARATION

TUNMISE AYODE OTITOJU

UNIVERSITI SAINS MALAYSIA
2019

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SEPARATION**

by

TUNMISE AYODE OTITOJU

**Thesis submitted in fulfilment of the
requirements for the degree of
Doctor of Philosophy**

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LIST OF ABBREVIATIONS

| | |
|-------|--------------------------------------|
| AFM | Atomic force microscopy |
| AG | Air gap |
| ANOVA | Analysis of variance |
| APTES | 3-aminopropyltriethoxysilane |
| ATR | Attenuated total reflection |
| BF | Bore fluid |
| BFT | Bore fluid temperature |
| CA | Contact angle |
| CBT | Coagulation bath temperature |
| CCD | Central composite design |
| CP | Condensation polarization |
| CPr | Coagulation power |
| DCMD | Direct contact membrane distillation |
| DEF | Dope extrusion flowrate |
| DEP | Dope extrusion pressure |
| DI | Deionized |
| DLS | Dynamic light scattering |
| DMAC | N-N-dimethylacetamide |
| DMF | Dimethylformamide |
| DMSO | Dimethylsulfoxide |
| DOE | Design of experiment |
| DR | Draw ratio |

| | |
|-------|---|
| EDX | Energy Dispersion X-Ray |
| EG | Ethylene glycol |
| FESEM | Field emission scanning electron microscopy |
| FRR | Flux recovery ratio |
| FTIR | Fourier transform infrared |
| HF | Hollow fiber |
| IE | Interfacial energy |
| LCST | Lower critical solution temperature |
| Md | Mean diameter |
| MMM | Mixed matrix membrane |
| MPS | Mean pore size |
| NPs | Nanoparticles |
| OPF | Oil permeate flux |
| OR | Oil rejection |
| PDA | Polydopamine |
| pdI | Polydispersity index |
| PEG | Polyethylene glycol |
| PES | Polyethersulfone |
| PSD | Pore size distributions |
| PVA | Polyvinyl alcohol |
| PWF | Pure water flux |
| RF | Relative flux |
| RFR | Relative flux reduction |
| RSM | Response surface methodology |

| | |
|------------------|----------------------------------|
| RT | Residence time |
| SiO ₂ | Silica |
| TEM | Transmission electron microscopy |
| TEOS | Tetraethylorthosilicate |
| TGA | Thermogravimetric analysis |
| TMP | Transmembrane pressure |
| TS | Take-up speed |
| UF | Ultrafiltration |
| UV | Ultraviolet |
| WCA | Water contact angle |