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Design and development of proton exchange membrane (PEM) from synthetic rubber and carbon nanoballs for PEM fuel cell

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PAPERS PUBLISHED AND PRESENTED DURING THE COURSE OF THIS STUDY

Journal Publications

1. **Abdulkareem, A. S,** Afolabi, A. S. Iyuke, S. E. and Pienaar, H. C. vZ (2007): Synthesis of carbon nanotubes by swirled floating catalyst chemical vapour deposition method. *Journal of Nanoscience and Nanotechnology, USA*. Vol. 7, No 9, pp 3233–3238.

2. Iyuke, S.E, **Abdulkareem, A.S,** Afolabi A.S and Pienaar, H. C. vZ (2007): Catalytic production of carbon nanotubes in a swirled fluid chemical vapor deposition reactor. *International Journal of Chemical Reactor Engineering. Vol 5, Note S5, pp 1-9.*

3. P. Mokwena, A. Marshall, A. S. Afolabi, **A. S. Abdulkareem**, and S. E. Iyuke (2007) Thermodynamic stability of graphitic diamond films produced using CCVD apparatus. *Journal of the Southern African Institute of Mining and Metallurgy*. Vol. 107, No 4, pp 211 – 214.

4. Afolabi A.S., **Abdulkareem. A.S** And Iyuke S.E. (2007): Synthesis of carbon nanotubes and nanoballs by swirled floating catalyst chemical vapour deposition method. *Journal of Experimental Nanoscience, Vol. 2, Issue 4, pp 269-277.*

5. Afolabi, A. S**, Abdulkareem, A. S**., Iyuke, S. E. and Pienaar, H.C.Vz (2009): Continuous production of carbon nanotubes and diamond films by swirled floating catalyst chemical vapour deposition method. *South African Journal of Science,Vol.105, pp 278-281.*

6. Idibie. C.A, **Abdulkareem A. S**, Pienaar C.H.vZ, VanDyk. L and Iyuke. S.E (2009): Synthesis of Low Methanol Permeation Electrolyte Membrane from Polystyrene Butadiene Rubber. Journal of Polymer –Plastic Technology and Engineering, Vol. 48, pp 1121-1129.

Papers Accepted for Publication

1. **Abdulkareem, A. S,** Idibie. C.A. Pienaar, H. C. vZ, Van Dyk. L and Iyuke, S. E: Synthesis and Characterization of Proton Exchange Membrane Using Polystyrene-Butadiene Rubber. Journal of Energy Source Part A.
2. Mhlanga, S. D, Iyuke, S.E, Afolabi, **A. S, Abdulkareem**. A. S, Kunjuzwa, N and Coville, N. J: Controlled CVD synthesis of carbon spheres in a vertical reactor. Journal of Experimental Nanoscience.
3. **Abdulkareem A.S,** Idibie C.A, Afolabi A.S, Pienaar .H.C.vZ, Iyuke S.E and Van Dyk. L: Proton conducting membranes for fuel cell application from polystyrene butadiene rubber: The effect of sulphonating agents on the membrane characteristics. Journal of Energy Source Part A.
4. Afolabi, A. S, **Abdulkareem, A. S**, Mhlanga, S. D, Coville, N. J and Iyuke, S. E (2009): Synthesis and purification of bi–metallic catalyzed CNTs in a horizontal CVD reactor. Journal of Experimental Nanoscience.

Conferences Proceedings and Presentations

1. Iyuke, S. E., Pienaar, C., **Abdulkareem, A. S***. and Afolabi, A. S (2006): Optimizing carbon nanotubes continuous production in a swirled floating catalyst chemical vapour deposition reactor. Paper presented at the *South African Chemical Engineering Conference, Durban 2006.*

2. Iyuke, S.E, **Abdulkareem, A.S*** and Afolabi A.S. (2007): Catalytic production of carbon nanotubes in a swirled fluid chemical vapor deposition reactor. Paper presented at the International Conference of Reaction Engineering XI, Bilbao, Spain.
3. Afolabi, A. S, **Abdulkareem, A. S,** Iyuke, S. E, Coville N. J. and Pienaar, H.C.vZ (2009): Preparation and characterization of CNT-platinum nanocatalysts for a proton exchange membrane fuel cell. *Proceedings of Nigerian Materials Congress NIMACON 2008,* November 3 – November 8, 2008, Akure, Nigeria.
4. Afolabi, A. S**, Abdulkareem, A. S,** Iyuke, S. E, Mhlanga, S. D and Coville N. J. (2009): Synthesis of bi–metallic catalyzed carbon nanotubes by a CVD method. *Proceedings of Nigerian Materials Congress NIMACON 2008*, November 3 – November 8, 2008, Akure, Nigeria.
5. **Abdulkareem, A. S*,** Afolabi, A. S, Iyuke, S. E. and Pienaar, H.C.vZ (2009): Development of proton exchange membrane (PEM) from synthetic rubber and carbon nanoballs. *Poster Presentation of the Hybrid Materials 2009, France,* March 23 – March 26 2009.
6. Idibie, C.A, **Abdulkareem, A. S,** Van Dyk. L, Iyuke, S. E. and Pienaar, H.C.vZ (2009): Modification of polystyrene butadiene rubber for proton exchange membrane fuel cell. *Poster Presentation of the Hybrid Materials 2009, France,* March 23 – March 26 2009.
7. **Abdulkareem A.S*,** Idibie C.A, Afolabi A.S, Iyuke S.E and Pienaar .H.C.vZ (2009): Development of proton exchange membrane (PEM) for Telecom fuel cell applications. Paper presented at the Southern Africa Telecommunication

Networks and Applications Conference (SATNAC 2009), Swaziland, August 30-September 2.

PATENT

Sunny Esayegbemu Iyuke, H.Cristo. van Zyl Pienaar, A.S. Abdulkareem, C.A. Idibie, A.S. Afolabi. Ion Exchange Membrane. South African Provisional Patent (Submitted).