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Conversion of FeCl_3 into FeSi fibrous structures at high temperature for gas sensing applications

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Abstract content
 (Max 300 words)

FeSi belongs to a class of narrow gap semiconductors and as a result it has been studied for more than 30 years because of its unusual properties such as its metal to insulator transition (MIT) in temperatures near 300K and the strong dependence of the magnetic susceptibility on the temperature [1,2]. The transitioning property of this material makes it an ideal candidate in the field of gas sensing. We report on the synthesis of FeSi nanostructure on silicon substrates using thermal chemical vapor deposition method. Anhydrous FeCl_3 powder was used as the precursor, N_2 gas was used to carry the precursor vapors to the silicon substrates which were placed at temperatures of 1100°C in a horizontal quartz tube furnace. Scanning electron microscopy images revealed fibrous structures made of single interwoven FeSi nanowires. XRD results confirm that the nanowires are FeSi with a B20 cubic crystal structure.

References

- [1] L.Ouyang, E.S. Thrall, M.M. Deshmukh, H. Park (2006). *Advanced Materials*, 18, 1437-1440.
 [2] J.R. Szczech, S. Jin. *Journal of Material Chemistry*, 2010, 20, 1375-1382.

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