Scopus

Documents

Ruslan, A.A., Mohamad, S.Y., Malek, N.F.A., Yusoff, S.H., Ibrahim, S.N., Rahman, F.A.

Performance Comparison of a Flexible Circular Microstrip Patch Antenna on Various Rubber-Carbon Compositions
(2023) *2023 IEEE International Symposium on Antennas and Propagation, ISAP 2023*, .

DOI: 10.1109/ISAP57493.2023.10388847

Department of Electrical and Computer Engineering, Kulliyyah of Engineering, International Islamic University, Malaysia

Abstract
In this paper, a flexible circular microstrip antenna using rubber substrate is proposed to operate at 2.45 GHz within the ISM band for wearable applications. Several rubber materials with different carbon filler compositions have been selected as the substrate for the antenna. This includes natural rubber (no carbon filler), rubber with 20% carbon filler, rubber with 25% carbon filler and rubber with 50% carbon filler. The performances of these antennas are simulated and analyzed based on the S11, bandwidth and gain. The antennas are also compared to two other flexible substrates; PDMS and RO3003. Based on the simulation results, antenna with natural rubber exhibits the best gain, while antenna with rubber and 50% carbon filler exhibits the widest bandwidth. © 2023 IEEE.

Author Keywords
carbon filler; flexible antenna; microstrip patch antenna; rubber substrate; wearable antenna

References

- Srinivasan, D., Gopalakrishnan, M.
Breast Cancer Detection using Adaptable Textile Antenna Design
(2019) *Journal of Medical Systems*, (43), p. 177.

- Za'aba, A.S., Ibrahim, S.N., Abdul Malek, N.F., Ramly, A.M.
Development of Wearable Patch Antenna for Medical Application
(2017) *2017 IEEE Regional Symposium on Micro and Nanoelectronics (RSM)*, pp. 260-263.

- Inum, R., Rana, M.M., Shushuma, K.N., Quader, M.A.
EBG Based Microstrip Patch Antenna for Brain Tumor Detection via Scattering Parameters in Microwave Imaging System
(2018) *International Journal of Biomedical Imaging*, pp. 1-12.

- Rahman, H.A., Rahim, S.K.A.
Dual band PDMS based Flexible Antenna for Wearable Application
(2015) *IEEE MTT-S International Microwave Workshop Series on RF and Wireless Technologies for Biomedical and Healthcare Applications (IMWS-BIO)*, pp. 193-194.

- Awang, Z., Affendi, N.A.M., Alias, N.A.L., Razali, N.M.
Flexible Antennas Based on Natural Rubber
(2016) *Progress in Electromagnetics Research*, 61, pp. 75-90.

- Shah, S.M., Kadir, N.F.A., Abidin, Z.Z., Seman, F.C., Hamzah, S.A., Katiran, N.
A 2.45 GHz Semi-Flexible Wearable Antenna for Industrial, Scientific and Medical Band Applications
(2019) *Indonesian Journal of Electrical Engineering and Computer Science*, 15 (2), pp. 814-822.

- Razali, N.M., Affendi, N.A.M., Alias, N.A.M., Awang, Z., Samsuri, A.
A Theorectical Investigation on the Effects of Rubber Filler Content on Flexible Antenna Performance
(2014) *TENCON IEEE Region 10 Conference*, pp. 1-4.

- Ruslan, A.A., Mohamad, S.Y., Abdul Malek, N.F., Yusoff, S.H., Zabri, S.N., Rahmad, F.E. **Design and Performance Analysis of Flexible Microstrip Patch Antenna with Rubber Substrate** (2021) *8th International Conference on Computer and Communication Engineering (ICCCE)*, pp. 156-161.

- Ruslan, A.A., Mohamad, S.Y., Abdul Malek, N.F., Yusoff, S.H., Ibrahim, S.N., Isa, F.N.M. **Design of Flexible Microstrip Patch Antenna using Rubber Substrate for Brain Tumor Detection** (2020) *IEEE Student Conference on Research and Development*, pp. 1-5.

Publisher: Institute of Electrical and Electronics Engineers Inc.

Conference name: 2023 IEEE International Symposium on Antennas and Propagation, ISAP 2023
Conference date: 30 October 2023 through 2 November 2023
Conference code: 196832

ISBN: 9798350341140
Language of Original Document: English
Abbreviated Source Title: IEEE Int. Symp. Antennas Propag., ISAP
2-s2.0-85184806050
Document Type: Conference Paper
Publication Stage: Final
Source: Scopus