Institute of Molecular Physics
Polish Academy of Sciences
Mariana Smoluchowskiego 17, 60-179 Poznań
tel. 61 8695 112, 234, fax 61 8684 524
www.ifmpan.poznan.pl

Dr Eng. Stanisław Wosiński
ADR Technology
Żeleńskiego 18, 80-285 Gdańsk

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STATEMENT

Subject: Project 02.03.02-22-0006/15 - Development of a composite material for shielding electromagnetic fields at high and low frequencies.

- Beneficiary: ADR Technology Stanislaw Wosiński,
- Project leader on the contractor's side: Dr.habil. B. Andrzejewski, Prof. IFM PAN

As part of the conducted research, the dispersion and absorption of electromagnetic fields as well as the dependence of electrical conductivity on frequency in the range of 0.1 Hz to 2 GHz were measured. In particular, the relationship between the electrical permittivity $\varepsilon^* = \varepsilon' - j\varepsilon''$ and magnetic permeability $\mu^* = \mu' - j\mu''$ (where $j^2 = -1$) and the absorption properties of materials supplied by ADR Technology was determined.

It was found that the absorption of electromagnetic field energy results from the cyclical changes in magnetization of materials and the accumulation and discharge of space charge at the grain boundaries of the material, occurring in accordance with the Maxwell-Wagner-Sillars model. Both cyclical changes in magnetization and electrical polarization are typically physical phenomena, as the processes of magnetization and charge flow in this case do not initiate chemical reactions nor alter the chemical composition of the materials.

Physical phenomena concern changes in the structure or state of a material without creating new chemical substances. In the studied materials, cyclical changes in magnetization and the accumulation of spatial electric charge were respectively the result of the rotation of magnetic moments and electric polarization and charge flow, and not changes in the chemical composition of these materials.

Bartłomiej Andrzejewski

Dr habil. Bartłomiej Andrzejewski, prof. IFM PAN