of frequency 17 GHz for the parallel polarized microwave (Fig. 3). There is an interval of transparency for the microwave at and around of 17 GHz. The comparison of scattered power dependencies for the perpendicular polarized microwave at two incident angles θ = 90° (Fig. 2) and θ = 60° (Fig. 6) shows that the features of both curves are different.

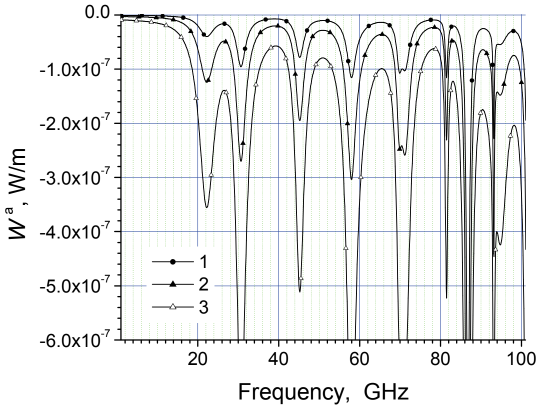

Fig. 4. Absorbed power dependency on incident microwave frequency for $\theta = 90^o$, $\psi = 0^o$

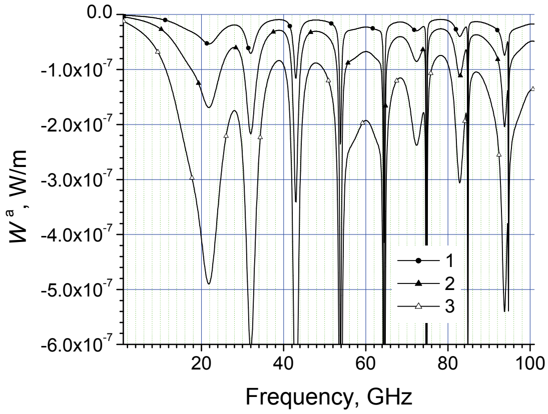

Fig. 5. Absorbed power dependency on incident microwave frequency for $\theta = 90^o$, $\psi = 90^o$

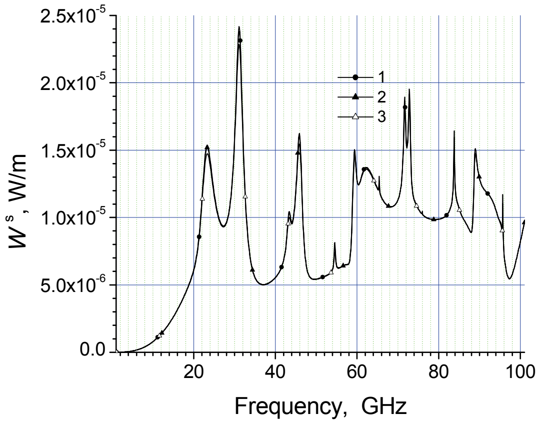

Fig. 6. Scattered power dependency on incident microwave frequency for $\theta = 60^o$, $\psi = 0^o$

For example, a shape of smooth minimum at *f*~46 – 58 GHz in Fig. 2 has a more complicated shape with an additional local maximum at *f* ~ 56 GHz in Fig. 6. A comparison of scattered power dependencies for the parallel polarized microwave at two incident angles $\theta = 90^o$ (Fig. 3) and $\theta = 60^o$ (Fig. 7) shows that the both curve extremums have the same position on the *f*–axis and they have different values.

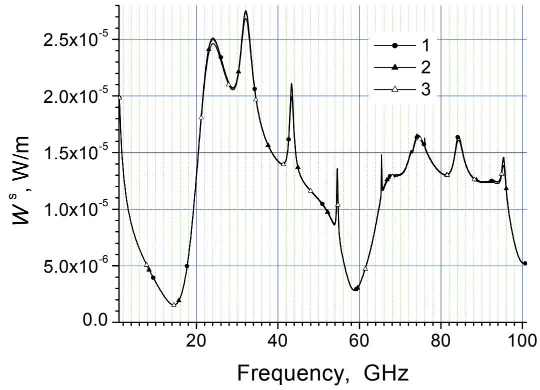

Fig. 7. Scattered power dependency on incident microwave frequency for $\theta = 60^o$, $\psi = 90^o$

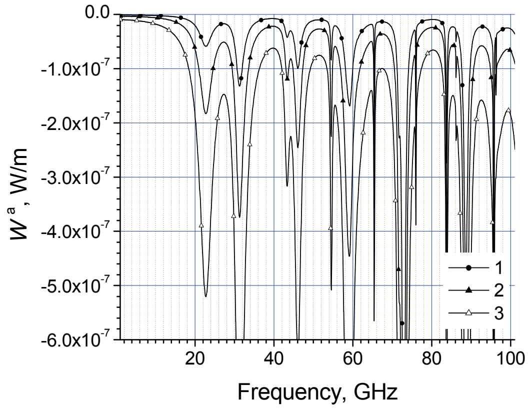

Fig. 8. Absorbed power dependency on incident microwave frequency for $\theta = 60^o$, $\psi = 0^o$

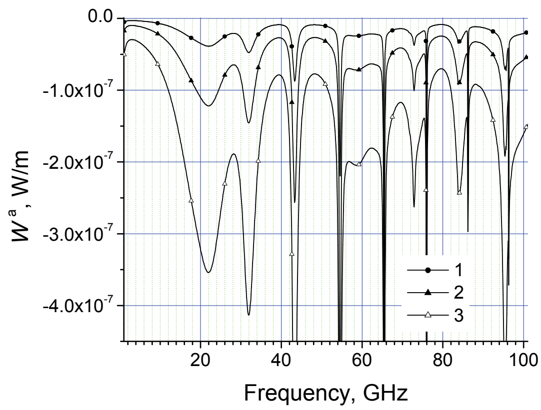

Fig. 9. Absorbed power dependency on incident microwave frequency for $\theta = 60^o$, $\psi = 90^o$

When the angle θ decreases then the scattered power dependency changes qualitatively. For example the scattered power dependencies for both microwave polarizations at angles $\theta = 60^o$ and 90^o were a strong different and these dependencies became very alike for both polarizations at small angles as $\theta = 5^o$.

The absorbed powers of both microwave polarizations depend on the semiconductor specific resistivity noticeably. We see in Figs 4, 5, 8, 9 that the absorbed power is the largest when the ρ magnitude is the smallest. The largest absorption is at the specific resistivity ρ = 10 Ω·m of *n*-Si material.

EM energy of the incident microwave is reflected and absorbed by every layer of cylinder and the energy can be strongly absorbed at certain wavelengths of incident microwave. It means that in a multilayered cylinder can be observed the dimensional resonances.

Conclusions

1. Analyses of scattered and absorbed microwave powers of conductor cylinder coated with twelve lossy semiconductor-glass layers is carried out on the base of the rigorous solution of the boundary diffraction problem.
2. The microwave power dependencies on the *n*-Si specific resistivity, the incident microwave frequency, polarization and direction of it propagation are implemented. The dispersion dependency of semiconductor material losses is taken into account.
3. A magnitude of absorbed power is strongly dependent on the *n*-Si material specific resistivity at the frequency range 1-101 GHz. The dependence on the specific resistivity shows that this multilayered cylindrical structure can be used for creating of microwave semiconductor sensors.

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The analysis of absorption and scattering dependencies of a multilayer cylinder on the incident plane wave frequency is presented. The cylinder consists of ideal conductor cylinder coated with twelve lossy n-Si semiconductor – glass layers alternatively. The calculation of the scattered and absorbed powers per unit length is based on the rigorous solution of scattering boundary problem. Calculations take into account the dispersion properties of n-Si material. Dependences are calculated for different values of semiconductor specific resistivity when the incident microwave propagates in the normal ($\theta = 90^o$) and oblique ($\theta = 60^o$) directions to the z-axis. Here are presented dependencies for the two polarizations of the incident microwave, i.e. the perpendicular ($\psi = 0^o$) and parallel ($\psi = 90^o$) ones. We discovered that there is a strong dependency of the absorbed power on the n-Si specific resistivity. There are intervals on the frequency f -axis where the scattered and absorbed powers have some small values, i.e., the microwave doesn't "see" the multilayer cylinder (Invisible Cloak) at some frequency bands. Ill. 9, bibl. 12 (in English; abstracts in English and Lithuanian).

L. Nickelson, J. Bučinskas. Laidaus cilindro, padengto dvylika stiklo ir puslaidininkio su n-Si savitąja varža sluoksnių, difrakcinės savybės mikrobangų diapazone // Elektronika ir elektrotechnika. – Kaunas: Technologija, 2011. – Nr. 9(115). – P. 47–50.

Tiriamos sklaidos ir sugerties priklausomybės nuo bangos dažnio, kai idealiai laidus cilindras, pakaitomis padengtas dvylika puslaidininkio ir stiklo sluoksnių, yra plokščiosios bangos lauke. Cilindro ilgio vienete sugeriama ir išsklaidoma galia apskaičiuojama naudojantis griežtu sklaidos kraštinio uždavinio sprendiniu. Skaičiuojant atsižvelgiama į dispersiją n-Si puslaidininkyje. Priklausomybės apskaičiuotos esant įvairioms puslaidininkio savitosios varžos vertėms, kai krintančiosios bangos kryptis yra statmena cilindro ašiai θ = 90^o ir kai su ašimi sudaro θ=60^o laipsnių kampą, o bangos poliarizacijos vektorius yra statmenas cilindro ašiai ($\psi = 0^o$), taip pat kai poliarizacijos vektorius yra cilindro ašies ir banginio vektoriaus plokštumoje ($\psi = 90^o$). Skaičiavimai rodo, kad sugertis labai priklauso nuo silicio savitosios varžos. Nustatyta, kad tirtamam daugiasluoksniam cilindrui būdingos mažos sklaidos ir kartu mažos sugerties dažnių juostos, kuriose mikrobanga „nemato“ daugiasluoksnio cilindro. Il. 9, bibl. 12 (anglų kalba; santraukos anglų ir lietuvių k.).