Abstract

Light scattering and fluctuations under extreme conditions

Ad LAGENDIJK

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We will review results on obtaining the strongest scattering materials. In addition to measuring transport properties we measure fluctuations in phase and amplitude of scattered light.

Our samples have been obtained with different preparation methods. A very promising method is the use of electrochemical etching. Recently, we have shown that macroporous gallium phosphide (GaP) can be obtained in that way. Gallium phosphide has a very high refractive index (n=3.3) at sub-band gap wavelengths and a band gap of 2.24 eV, corresponding to a wavelength of 0.55 microns. This makes GaP transparent for light in the red part of the visible spectrum.

We present a detailed investigation of pore formation and the scattering strength as a function of the doping concentration and the etching potential. It is easy to tune the scattering strength of porous GaP in a wide range. Enhanced backscattering and transmission measurements are used to quantify the scattering strength of porous GaP.

We will discuss the possibility of anistropic etching in which the goal is to make samples with mean free paths that depend on direction.

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