EU08

The Technology of Selective Separation of Metal and Non-metal Materials Form Specific Materials

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The purpose of this study is recycling metals and non-metals from electro-technical waste by means of magneto-fluid separation. Electro-technical waste are considered used light bulbs , neon lamps .

The method : A magnetic-fluid's density can be changed and controlled by applying an external magnetic field. The separation of materials can be achieved using this principle and is called magneto-fluid separation. A non-magnetic object sunk into a magnetic fluid , will levitate in the presence of magnetic field . This levitation can be controlled by controlling the magnetization of the fluid. The device used in this study uses levitation to separate the waste and acts as a density spectrograph. [1]

For this method to be profitable it is very important not to lose the magnetic fluid stuck on the separated granule. [2]

The magneto-fluid separation process is suitable for light bulbs and car light bulbs but is not that suitable when working with neon lamps because of the very small amount (< 3%) of non-metals contained.

The practical importance of this paper : It is a theoretical and experimental study of the role magnetic fluids can play in the recycling of unused materials / rock or electro-technical waste. For a start , we propose building an experimental industrial installation capable of processing around 200 tons of waste / year.

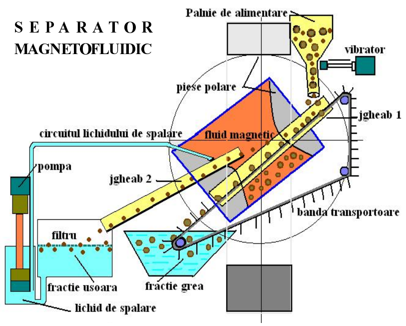

Fig. 1. The separation installation.

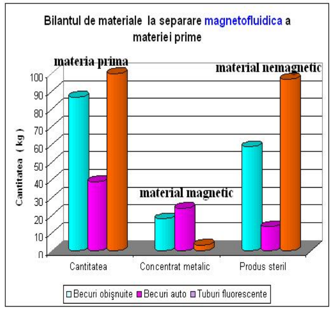

Fig. 2. Amount of separated substances.

[1] Gheorghe Călugărul, Emil Luca, Rodica Bădescu, Constantin Cotae, Vasile Bădescu, „Ferofluidele şi aplicaţiile lor în industrie" Ed.Tehnică, Bucureşti, 1978.
[2] Stanci A., Iuşan V.-„ *Aplicaţii tehnologice ale fluidelor magnetice*" Conferinţa Mondială de Fizică , Iaşi, (1992).

EU09

Magneto-optical Responses of Low Tc Amorphous Magnetic Films for Heat-assisted Magneto-optic Spatial Light Modulator

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Magneto-optic spatial light modulator (MOSLM) is a magnetic micro-device for modulating intensity, phase or polarization of light based upon the magneto-optical effects. Bismuth-substituted yttrium iron garnet films are good constitutive materials for MOSLM [1,2], although optical absorption of these films becomes considerably large at short wavelength of light. To overcome this problem, use of metallic magnetic films with perpendicular magnetization, such as amorphous TbFe film, in reflection optical geometry is attractive. The magnetization control in the MOSLM can be achieved by the method of a heat-assisted magnetic recording, where the films with low Curie temperature (Tc) and large magneto-optical responses are necessary. In this respect, we here studied experimentally the magneto-optical responses of amorphous rare-earth iron films with low Tc and discussed their use in MOSLM. The films examined here are low Tc amorphous alloy films such as DyFe films with Ho or Er as third additional elements. These films were fabricated by RF magnetron sputtering on glass substrates, and their Tc and magneto-optical responses were studied together with those of amorphous TbFe films for comparison. The composition of the fabricated film was evaluated by EDX, while the magnetic characteristic and magneto-optical Kerr rotation angle were measured by VSM and magneto-optical measurement system, respectively. Both Tb_xFe_{1-x} (x = 21) and Dy_xFe_{1-x} (x = 22) had perpendicular magnetization and approximately 0.1 deg of Kerr rotation angle at the wavelength of light from 400 nm to 800 nm. Currie temperature Tc was 120 °C for the $Tb_{21}Fe_{79}$ film while 60 °C for the $Dy_{22}Fe_{78}$ film. Fig. 1 shows Tc and magneto-optical response of $DyxFe_{1-x}$ (x = 22), $Ho_xDy_{22-x}Fe_{78}$ (x =4 and 8) and $Er_xDy_{20-x}Fe_{80}$ (x = 3 and 6) films. The addition of Ho or Er into the DyFe system was effective for reducing the Tc of films. However, the Kerr rotation was decreased. The reduction in Tc was dependent on the amount of the additional element. This meant that the MOSLM could be fabricated with the fitted Tc material. In addition, we will present about the performance of new drive-typed MOSLM with low Tc magnetic material, heating with semiconductor laser for switching pixel.

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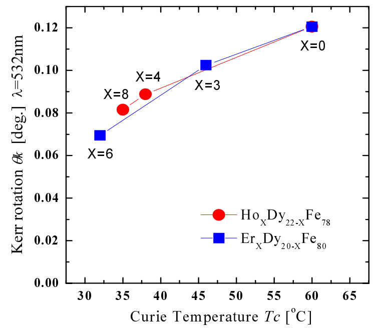

Fig. 1. Kerr rotation angle and Curie temperature of DyFe, HoDyFe and ErDyFe films. The angle of Kerr rotation was measured at the wavelength of 532 nm.

[1] J.H.Park, J.Cho, K.Nishimura and M.Inoue, Jpn.J.Appl.Phys. 41, 1813 (2002).
[2] H.Takagi *et al.,* J.Magn.Soc.Jpn., 30,581(2006).