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Levitation separation of precious metals utilizing magneto-Archimedes effect in high gradient magnetic fields

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We studied the levitation separation for precious metals utilizing magneto-Archimedes effect in high gradient magnetic fields. In order to enhance the magnetic force cylindrical ferromagnetic materials were set into a 10 T superconducting solenoidal magnet. The power factor of BgradB for magneto-Archimedes force reached the high value over -1000 T2/m by the optimum arrangement of ferromagnetic materials. We studied the magnetic levitation properties for several kinds of precious metals such as silver, gold and platinum in manganese chloride aqueous solution as a paramagnetic liquid medium. The experimental results showed that silver, gold and platinum levitated at each different height. The levitation height for each metal was almost the same as its own theoretical one, and could be controlled by the positioning of ferromagnetic materials. This indicates the possibility of the magnetic separation for the mixture which is difficult to be separated by the usual method utilizing magneto-Archimedes effect in high gradient magnetic fields.

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