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Novel metal recycling process by applying intelligent comminution and sorting

Conventional metal recycling process usually involves comminution, physical concentration, pyro- and hydro-metallurgical stages to produce high purity metal phases. Separation accuracy is high in the last two stages but not relatively low in the first two stages because the target materials of solid phase treatment are quite heterogeneous. Recently, an innovative development of comminution and physical separation stages has achieved, such as selective crushing with heating-quenching, microwave irradiation, electric disintegration/fragmentation, surface grinding, etc. and various sensor based sorting technologies, NIR, XRT, XRF, LIBS, and so on. The paper introduces several examples of the above technologies for concentrating minor rare metals from WEEE, PGMs (platinum group metals) from spent automobile catalyst, and for mutual separation of aluminum alloys in the scraps. The author also proposes several novel metals recycling processes by combining such brandnew technologies in order to reduce the total energy required in the processes. It was assumed from life cycle assessment that one of the processes could produce high purity metal phase with almost one third energy.

Biography

Shuji Owada is currently working as a Professor in Waseda University, Japan. He completed his MEng., in Mineral Processing from Waseda University, Japan, 1981. He has completed his PhD in Mineral Processing from the same Waseda University, Japan, 1984. He started working as a Lecturer in 1984 in Waseda University and later on he continued his work as an Associate Professor and now he is a Professor in the same university.

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