

廢單晶矽太陽能電池中矽資源回收之研究

李清華¹ 洪基恩^{1*} 蔡尙林² 廖靖華¹

¹大葉大學環境工程學系

51591 彰化縣大村鄉學府路 168 號

²永源化工原料股份有限公司

33759 桃園縣大園鄉中山北路 280 巷 13 號

摘要

全球太陽能電池日益普及，因此於製程中衍生之廢棄太陽能電池數量亦逐年增加，廢矽晶類太陽能電池之主要成分為矽、銀、鋁，由於這些有價資源值得進一步回收，於是本研究將利用研磨篩分，浸漬溶蝕等方法來回收廢單晶矽太陽能電池中矽、銀、鋁有價資源金屬。根據本研究成果所示，廢太陽能電池中之鋁可以硫酸予以 100% 去除，另於上述條件完成後，再將含矽、銀殘渣以硝酸予以 100% 去除溶銀金屬，因此經硫酸與硝酸溶蝕後僅剩矽有價資源。

關鍵詞：廢單晶矽，太陽能電池，矽，銀，鋁，回收

Silicon Resource Recovery of Spent Monocrystalline Silicon Solar Batteries

CHING-HWA LEE¹, CHI-EN HUNG^{1*}, SHANG-LIN TSAI² and CHING-HUA LIAO¹

¹*Department of Environmental Engineering, Da-Yeh University
No.168 University Rd., Dacun, Changhua 51591, Taiwan, R.O.C.*

²*Consultant, Yung Yuan Chemical Materials Crop*

No. 13, Lane 280, Zhongshan North Road, Dayuan, Taoyuan 33759, Taiwan, R.O.C.

ABSTRACT

As solar batteries become increasingly popular worldwide, increasing numbers are manufactured annually, leading to the accumulation of spent batteries. The chief element of spent silicon solar batteries is silicon, which is a valuable resource worth recovering. In addition to silicon, these batteries contains small amounts of silver and aluminum. This study uses techniques such as grinding, screening and leaching to remove the impurities of silver and aluminum from these batteries to obtain a high-purity of silicon. In this study, 100% of the aluminum impurities were removed by sulfuric acid, and 100% of the silver impurities were removed by nitric acid. Following removal in sulfuric acid and nitric acid, a high purity of silicon was achieved.

Key Words: spent monocrystalline, solar battery, silicon, silver, aluminum, recycle