

# Vanadium Battery

Incredible **durability** and **safety** (free from fire or explode accident)!  
**Similar energy density to lead battery, but with super quick charge/discharge ability**

## Introduction

An increasing demand for battery appears in recent years, among which, Li-ion battery (LiB) is most notable for its compatibility in various fields. However, it is doubtful that if the limited Lithium resource could meet the growing need for LiB in future. Unfortunately, other existing batteries, such as Lead battery, Nickel-metal hydride battery (NiMH), and NAS battery, all have their limitations. The main composition lead of Lead battery, has an environment pollution problem and so as to be restricted by RoHS order (Restriction of Hazardous Substances Directive) forbidding to be applied in other fields. As same as LiB, NiMH's development is also limited by its using of rare earth element. And NAS battery has to be handled with extremely care, as a result, it is unfavorable to be spread in common scene.

This invention reveals a new Vanadium battery which is probably meet all the requirement for next generation battery.

## Effect & Application

- Super quick charge/discharge, excellent durability (150,000 times of charging), good energy density comparable with lead battery
- Alternative in parts of lead battery (accumulator) and LiB

## Patent Data Sheet

Patent No.(Serial No.): 5580327(JP), 5904447(JP), 9419279(US), 102668224(CN), 1499632(KR), EP (GRANT ANNOUNCED), IN, TH. Know-how is provided as well.

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### This invention (objective)

	Item	Vanadium Battery	LiB	Quick charge/discharge LiB	Lead battery	Charge/discharge lead battery
1	Energy density (Wh/L)	~50 (max)	600	90	60	70
2	Durability (Charge times)	150,000	4000	15,000	5,000	5,000
3	Cost (JP Yen/Wh)	50	~100	200~	50	60
4	Charge/discharge property (C) ※	10	2	10	Charge:0.1 Discharge:0.2	0.2

※ C rate: 1C means a full charge or discharge action can be done for 60 minutes. Thus nC (the number of C) reveals charge/discharge property related to charging speed of batteries. For example, 10C costs 60 minutes/10 = 6 minutes; 100C costs 60 minutes/100 = 0.6 minute = 36 seconds.

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