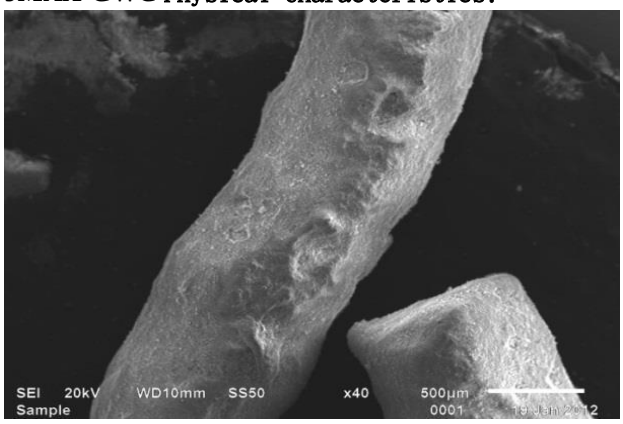
Nuclear Energy Institute
Atomic Energy Council of Taiwan

"Application JMAX-GWC adsorption of radioactive Cs and Sr study"
Technical Services Case
Closing Streamline Reporting

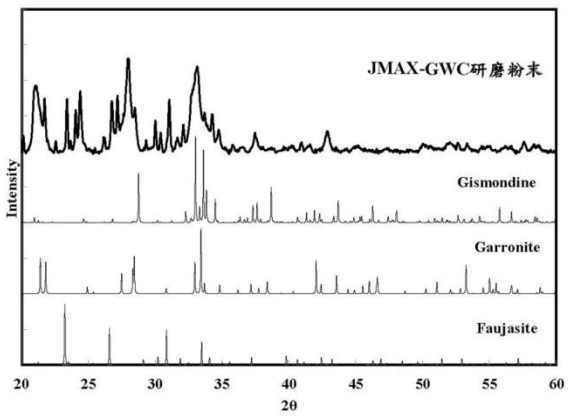
Client: Hearty Biotechnology CO., LTD.
合締生物科技有限公司

Report Date：June 9, 2014

JMAX-GWC Physical Characteristics:



Pic.1 JMAX-GWC Electron microscope at a magnification of 40 times the surface patterns



Pic 2 JMAX-GWC ground powder XRD analysis and other reference material ratio on the map

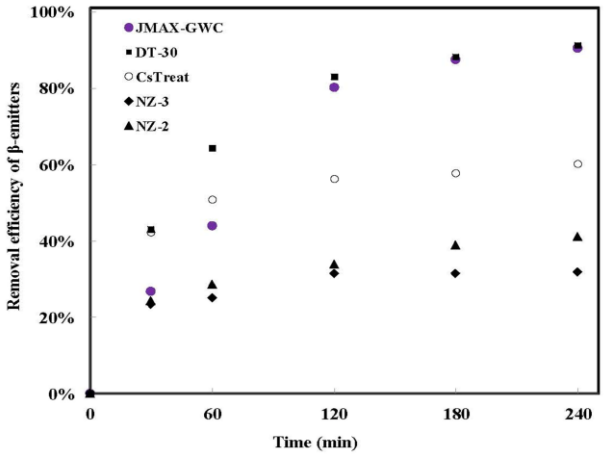
Tab. 1 JMAX-GWC Physical Characteristics

Particle size	1.0~3.0 mm
Particle density (g/mL)	1.51
Bed density (g/mL)	0.66
Color	white gray
BET specific surface area (m2/g)	112
Cs+ Adsorption capacity (mg/g)	45.66
Sr2+ Adsorption capacity (mg/g)	35.34

Different materials and JMAX-GWC adsorption rate of ^{137}Cs and ^{90}Sr:DT-30 in there fast adsorption rate, JMAX-GWC followed, in order, is CsTreat, Nitto zeolite No.2 (NZ-2) and No.3 (NZ-3).

Tab. 2 Different materials in 4hrs of total beta activity concentration in water removal efficiency

Material	Removal efficiency of β-emitters at 240 min. (%)
JMAX-GWC	90.4
DT-30	91.1
Cs-Treat	60.1
NZ-2	41.1
NZ-3	31.7



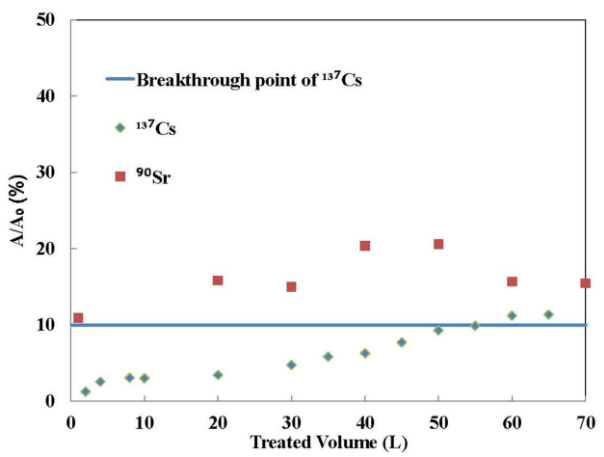
Pic 3 Different materials with time on total beta activity concentration in water removal efficiency(1.0 g sorbent immersed in 100 mL of mineral water containing ^{137}Cs and ^{90}Sr activity concentration of about 3000 and 100 Bq / mL)

Continuous string instruction argument Study:

Retention Time: When its retention time is too short, the liquid and the contact time is less than JMAX-GWC low adsorption efficiency, with the increase of the residence time, which increases efficiency, When the residence time is greater than 1.5 mins.after gradually leveled off its adsorption efficiency not change much. JMAX-GWC for ^{137}Cs and ^{90}Sr removal efficiency reached 98% and 85%.

Adsorbent bed height: Of ^{137}Cs and 90Sr in terms of the bed height in the range 1.6 to 16cm this adsorption efficiency did not cause a significant impact, but the bed height 16 cm when the removal efficiency of ^{90}Sr may be raised to 90%.

Through the curve: JMAX-GWC loading of 10 g (flow to 10.27 mL / min), and define when ^{137}Cs activity ratio of water and raw water activity of the (A / A0) greater than 10%, or break out through the point. After about 55 liters of water, ^{137}Cs break through the point where the total inflow ^{137}Cs activity was 1.81 × 108Bq, and ^{137}Cs activity adsorbed about 1.72 × 108Bq. For ^{90}Sr, since its low concentration, A / A0 no significant change after treatment of 70 L of water. After 70 liters of treated water per gram JMAX-GWC totally adsorbed ^{90}Sr 2.33 × 107Bq of ^{137}Cs and 5.34 × 105Bq.



Pic. 4 10 g JMAX-GWC adsorption of ^{137}Cs and ^{90}Sr curve through (10.27 ml / min, ^{137}Cs activity conc. starting ~ 3320 Bq / mL, ^{90}Sr initial activity conc. ~ 110 Bq / mL)