Study on the Preparation of the Precursor of the Li-ion Screen Based on Big Data Analysis

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Abstract. In order to improve the preparation ability of lithium ion screen precursor, an anti-interference high definition lithium ion screen precursor preparation data dynamic migration and information enhancement method based on dynamic migration equilibrium modulation is proposed. The dynamic migration transmission channel model of HD lithium ion screen precursor preparation is constructed, and the anti-interference design of HD lithium ion screen precursor preparation is carried out by using interference filtering algorithm. The dynamic migration state characteristic of the preparation data of HD lithium ion screen precursor is extracted, and the Porter interval equilibrium method is used to control the dynamic migration of HD lithium ion screen precursor preparation data. The dynamic migration optimization of preparation data of anti-interference HD lithium ion screen precursor is realized, and the anti-interference and safety of lithium ion screen precursor preparation are improved. The simulation results show that the preparation of HD lithium ion screen precursor by this method is safe and has strong anti-interference ability.

Index Terms: Big data analysis · Lithium ion · Preparation of screen precursor

1 Introduction

At present, many aspects of the country need to use lithium or its compounds. With the country paying more and more attention to high technology, the demand for lithium in the market is increasing rapidly, and the lithium resources are less and less, which requires lithium extraction from liquid lithium resources. The reserves of lithium resources in the ocean are about 260 billion tons, less than 1/10000 tons on land. Therefore, it is urgent to extract lithium from low lithium concentration seawater, geothermal may protect the environment and improve the efficiency. In this paper, while standing on the shoulders of giants, we continue to explore the preparation technology of lithium-ion screen membrane, and find out a better method. Generally speaking, water and salt lake brine [1], in which the application of ion screen adsorption we should find out better film-forming materials and focus on the amount of lithium ion screen precursor. With the development of preparation technology of lithium ion screen precursor, higher requirements are put forward for the security and anti-interference of the network, and it is necessary to control the dynamic migration of

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the preparation data of high definition lithium ion screen precursor. The transmission link model of HD lithium ion screen precursor preparation is analyzed. The dynamic migration and enhancement of HD lithium ion screen precursor preparation data is carried out by anti-interference filtering method, the network design is optimized, and the adaptive control ability of the network is improved. The research on data dynamic migration and information enhancement of HD lithium ion screen precursors has attracted great attention [2].

Traditionally, the security enhancement methods for dynamic migration of high definition lithium ion screen precursors mainly include fuzzy control method, adaptive equilibrium control method and interval equilibrium control method. The embedded virtual network is used to realize the dynamic migration of the preparation data of the anti-interference high-definition lithium-ion screen precursor, the big data transmission control is carried out, and the dynamic forwarding and migration design of the anti-interference high-definition lithium-ion screen precursor preparation data is carried out [3]. The self-adaptability and fuzziness of the above methods for the dynamic migration safety control of anti-interference high-definition lithium-ion screen precursors are not good, in order to solve the above problems, A data dynamic migration and information enhancement method for anti-interference HD lithium ion screen precursors based on dynamic migration equilibrium modulation is proposed. The dynamic migration transmission channel model of HD lithium ion screen precursor preparation is constructed, and the anti-interference design of HD lithium ion screen precursor preparation is carried out by using interference filtering algorithm. The dynamic migration state characteristic of the preparation data of HD lithium ion screen precursor is extracted, and the Porter interval equilibrium method is used to control the dynamic migration of HD lithium ion screen precursor preparation data. The dynamic migration optimization of preparation data of anti-interference HD lithium ion screen precursor is realized, and the anti-interference and safety of lithium ion screen precursor preparation are improved. Finally, the simulation results show the superior performance of this method in improving the dynamic migration and information enhancement ability of HD lithium ion screen precursors [4].

2 Data Transmission Channel Model and Interference Suppression for Precursor of High-Definition Lithium Ion Screen

2.1 Data Transmission Channel Model for Precursor of Li-ion Sieve

In order to realize the dynamic migration and the information enhancement of the anti-interference type lithium ion sieve precursor preparation data, a data transmission channel model of an anti-interference type lithium ion sieve precursor system is first constructed, and the channel output structure of the anti-interference type lithium ion sieve precursor preparation data is combined and controlled, the self-adaptive random link forwarding control protocol is adopted to carry out the balance control of the anti-interference type lithium ion sieve precursor system standby data transmission, the baud interval equalization control technology is adopted [5], and the fuzzy self-adaptive Arabic-complete processing of the data output of the precursor of the lithium ion screen is carried out, the anti-interference filtering design is carried out on the weighting result, the balance control of the data transmission channel of the precursor of the lithium ion screen is realized, and the average mutual information characteristic quantity of the anti-interference type lithium ion sieve precursor preparation data is extracted, the time reversal processing is carried out on the data output bit sequence flow of the anti-interference type lithium ion sieve precursor preparation data output, and the balance of the data output of the anti-interference type lithium ion sieve precursor preparation data output is realized, the anti-interference type lithium ion sieve precursor preparation data distribution model is constructed by adopting a cooperative Kalman filtering algorithm to realize the anti-interference type lithium ion sieve precursor preparation data distribution, and the load of the preparation data of the precursor of the lithium ion sieve is $E_j = \sum_k |C_j(k)|^2$, According to the load of the data dynamic migration of the precursor of the lithium ion sieve, the dynamic migration control of the network is carried out by adopting a fuzzy self-adaptive equalization scheduling method[, and the learning function of the anti-interference type lithium ion sieve precursor preparation data transmission is as follows:

$$\begin{cases} \min \sum_{1 \le i \le K} \sum_{e \subseteq k(e)} \frac{f(e(i))}{C(e,i)} \\ 0 \le f(e,i) \le C(e,i) \\ F = const \\ \sum_{1 \le i \le K, e \subseteq k(e)} \frac{f(e(i))}{C(e,i)} + \sum_{e \subseteq k(e)} \frac{f(e^{'}(i))}{C(e^{'},i)} \le k(v) \end{cases} \quad (1)$$

The filter detection of anti-interference lithium ion screen precursor preparation data is carried out by link random allocation method. The spatial sampling load of anti-interference lithium ion screen precursor preparation data is expressed as follows:

$$\begin{aligned} Compution(n_j) &= (E_{elec} + E_{DF})l\delta + E_{Tx(l,d_j)} \\ &= (E_{elec} + E_{DF})l\delta + lE_{elec} + l\varepsilon_{fs} d_j^2 \\ &= [(E_{elec} + E_{DF})\delta + E_{elec} + \varepsilon_{fs} d_j^2]l \end{aligned} \quad (2)$$

the load balance design of the anti-interference type lithium ion sieve precursor preparation data is carried out by adopting a link random distribution method [8], a self-correlation matched filter is designed, the multi-path suppression of the data transmission of the precursor system of the lithium ion sieve is realized through a direct sequence spread spectrum method [6], the output load and the balance scheduling formula of the obtained network are expressed as follows:

$$\eta_k^w(\omega) = E\left(T_k^w \middle| T_k^w > \xi_k^w(\omega)\right),\ k \in R_w, w \in W \tag{3}$$

The channel model of data allocation prepared by lithium ion screen precursor is constructed. The subsequence of channel dynamic migration and information enhancement scheduling set is obtained by using time reversal mirror:

$$r_1(n) = r_2(n)\exp(-j\omega_0 T_p/2),\ n = 0, 1, \ldots, (N-3)/2 \tag{4}$$

The $(N-1)/2$ point Fourier transform of $r_1(n)$ and $r_2(n)$ is carried out respectively, and the optimal design of data transmission channel for lithium ion screen precursor preparation is realized [7].

2.2 Anti-interference Design of Lithium Ion Screen Precursor Preparation

The interference filtering algorithm is used to design the anti-interference of lithium ion screen precursor preparation, and the cooperative filtering method is used to sample the code element of lithium ion screen precursor system, and the output dynamic load is obtained as:

$$R_1(k) = R_2(k)\exp(-j\omega_0 T_p/2),\ k = 0, 1, \ldots, (N-3)/2 \tag{5}$$

$$R_2(k) = A_k \exp(j\varphi_k), \qquad k = 0, 1, \ldots, (N-3)/2 \tag{6}$$

Wherein, the dynamic transmission delay of the preparation data of the lithium ion screen precursor is the mean value of the linear equilibrium, the variance is the variance, and the received symbol sequence of the anti-interference filtering of the data prepared by the lithium ion screen precursor is expressed as follows:

$$t_a = E(T_a) = t_a^0 + \beta t_a^0 \mathrm{E}((V_a)^n)E(1/(C_a)^n),\ a \in A \tag{7}$$

$$E\left((T_a)^2\right) = \left(t_a^0\right)^2 + 2\beta\left(t_a^0\right)^2 E((V_a)^n)E(1/(C_a)^n) + \left(\beta t_a^0\right)^2 E\left((V_a)^{2n}\right)E\left(1\Big/(C_a)^{2n}\right),\ a \in A \tag{8}$$

$$\varepsilon_t^a = Var(T_a) = E\left((T_a)^2\right) - (E(T_a))^2,\ a \in A \tag{9}$$

According to the above analysis, the interference filter anti-interference model of dynamic migration of lithium ion screen precursor preparation data is constructed [8].

3 Dynamic Migration and Information Enhancement Processing

3.1 Equilibrium Control of Dynamic Migration of Lithium Ion Screen Precursor Preparation Data

On the basis of the above construction of the data dynamic migration transmission channel model of lithium ion screen precursor preparation and the anti-interference design of lithium ion screen precursor preparation by using interference filtering algorithm [9], the data dynamic migration and information enhancement optimization design of lithium ion screen precursor preparation are carried out. in this paper, a dynamic migration and information enhancement method of lithium ion screen precursor preparation data based on dynamic migration equilibrium modulation is proposed. The dynamic migration state characteristics of lithium ion screen precursor preparation data were extracted. The load in the dynamic migration process of lithium ion screen precursor preparation data was obtained as follows:

$$\begin{aligned} C_{T'}(f)Y_{T'}(f) &= C_{T'}(f)\sum_{n} x\left(f-\frac{n}{T'}\right) e^{j2\pi\left(f-\frac{n}{T'}\right)\tau_0} \\ &= C_{T'}(f)X(f)\, e^{j2\pi f\tau_0} \end{aligned} \tag{10}$$

According to the channel characteristics, the equilibrium scheduling and the balanced allocation of big data are carried out, and the mean value of load distribution Q^w, V_a,F_k^w of lithium ion screen precursor preparation data is obtained by using coherence detection method]. From this, the average mutual information characteristic quantity of the preparation data of lithium ion screen precursor can be obtained as follows:

$$q^w = E(Q^w) = \sum\nolimits_{k\in R_w} f_k^w,\ w\in W \tag{11}$$

$$v_a = E(V_a) = \sum\nolimits_{w\in W}\sum\nolimits_{k\in R_w} \delta_{ak}^w f_k^w,\ a\in A \tag{12}$$

$$f_k^w \geq 0,\ k\in R_w, w\in W \tag{13}$$

The measurement distance for calculating the preparation data of lithium ion screen precursor is as follows:

$$\|\boldsymbol{r}\| = \sqrt{\sum_{i=0}^{m} r_i^2 \left\|\boldsymbol{v}_{\boldsymbol{\sigma(i)}}^*\right\|^2 + \|\boldsymbol{w}\|^2} \geq |r_m|\left\|\boldsymbol{v}_{\boldsymbol{\sigma(m)}}^*\right\| \tag{14}$$

The dynamic migration and the information enhancement output iteration equation are obtained by adopting an adaptive feedback adjustment method to carry out channel equalization modulation of the data dynamic migration of the precursor of the lithium ion screen:

$$f_{ij}(n+1) = f_{ij}(n) + \mu_{MCMA} \frac{\partial J_{MCMA}(n)}{\partial f_{ij}(n)} \tag{15}$$

In which, μ_{MCMA} represents an initial load, and according to the algorithm and the model design, the balance control of the dynamic migration of the preparation data of the precursor of the lithium ion screen is realized, and the stability and the channel self-adaptive distribution performance of the data migration process are improved [10].

3.2 Optimization of Data Dynamic Migration for Precursor System of Li-ion Screen

The data distribution model of lithium ion screen precursor preparation was constructed, and the impulse response of lithium ion screen precursor preparation data was obtained by using decentralized control protocol under the condition of static mapping:

$$\begin{cases} y(t) = x(t - t_0) \Rightarrow W_y(t, v) = W_x(t - t_0, v) \\ y(t) = x(t)e^{j2\pi v_0 t} \Rightarrow W_y(t, v) = W_x(t, v - v_0) \end{cases} \tag{16}$$

The impulse response of the preparation data of lithium ion screen precursor is calculated. In the dynamic migration and information enhancement of big data prepared by lithium ion screen precursor, the link allocation is carried out according to the synthesis characteristics of lithium ion screen precursor preparation channel [11]. The dynamic migration normal distribution of the preparation data of the lithium ion screen precursor satisfies $X \sim S_\alpha(1, \beta, 0), 1 < \alpha < 2$, the inertia characteristic distribution of the dynamic migration of the preparation data of the lithium ion screen precursor is obtained by:

$$y(t) = \sqrt{k}x(kt), k > 0 \tag{17}$$

$$W_y(t, v) = W_x(kt, v/k) \tag{18}$$

Wherein, G represents the characteristic resolution of the preparation data distribution of the precursor of the lithium ion sieve, v represents the modulation frequency, and W_x is a combined state estimation of the data dynamic migration load of the precursor of the lithium ion sieve. The dynamic migration load response control model for the preparation data of the precursor of the lithium ion screen is calculated, and the formula is expressed as:

$$\begin{aligned} \Phi(\omega) &= E[e^{j\omega X}] \\ &= \begin{cases} \exp\{j\mu\omega - |\sigma\omega|^\alpha[1 - j\beta \mathrm{sgn}(\omega)\tan(\frac{\pi\alpha}{2})]\}, \alpha \neq 1 \\ \exp\{j\mu\omega - |\sigma\omega|^\alpha[1 + j\beta \mathrm{sgn}(\omega)\frac{2}{\pi}\ln|\omega|]\}, \alpha = 1 \end{cases} \end{aligned} \tag{19}$$

In embedded environment, the output of the $j = 0, 1, \ldots, M$ sampling point to obtain the dynamic migration state characteristic quantity of lithium ion screen precursor preparation data is as follows:

$$x(t)e^{j\pi t^2 \cot\alpha} = \sum_{n=-N}^{N} x(\frac{n}{2\Delta x})e^{\frac{j\pi(\cot\alpha)n^2}{(2\Delta x)^2}} \sin c\left[2\Delta x\left(t - \frac{n}{2\Delta x}\right)\right] \quad (20)$$

Porter interval balancing method is used to control the dynamic migration of lithium ion screen precursor preparation data, and the dynamic migration optimization of lithium ion screen precursor preparation data is realized [12]. the dynamic load migration scheduling model is obtained as follows:

$$G(U\Big|\mu_k, \sum{}_k) = (2\pi)^{-d/2}\Big|\sum{}_k\Big|^{-1/2} \times \exp\left[-\frac{1}{2}(U - u_k)^T \sum{}_k^{-1} (U - u_k)\right] \quad (21)$$

In the above formula, the $G(U|\mu_k, \sum{}_k)$ is expressed as the feature quantity of the dynamic migration of the data of the precursor of the lithium ion sieve and the information enhancement, U represents the bandwidth of the channel, and u_k represents the symbol sequence for dynamic migration of the data of the precursor of the lithium ion sieve. In this paper, the data dynamic migration and information enhancement of the precursor of the lithium ion screen are realized.

4 Simulation Experiment and Result Analysis

In order to test the application performance of this method in the dynamic migration and information enhancement of lithium ion screen precursor preparation, the experimental test was carried out, and the simulation analysis was carried out by MATLAB. VC casting liquid solution is to dissolve PVC (fixed quantity) in DMAc. Li1.6Mn1.6O4 is mixed with PVC casting liquid solution, then heated and stirred at 80 °C, Li1.6Mn1.6O4 is uniformly dissolved to form casting film solution. After cooling, a layer of liquid film (of a certain thickness) is scraped off the clean glass plate with a scraper and placed in ion water. The two are separated automatically. Finally, Li. Li1.6Mn1.6O4 was extracted from hydrochloric acid of 0.5 mol/L to change the mass concentration of PVC casting solution, and the effect of the concentration of casting solution on the adsorption capacity was studied. The concentration of casting solution remained unchanged and the effect of Li1.6Mn1.6O4 addition on the adsorption capacity was observed. PVC lithium ion screen precursor membrane and lithium ion screen membrane were marked as Li-MPVC-x-y and H-MPVC-x-y, respectively. Assuming that the distribution region of the preparation data transmission of the lithium ion screen precursor is the uniform square region of the 400 m * 400 m, and the sample sequence bandwidth of the sample output of the lithium ion screen precursor preparation data is 140 Gbit, The intensity of intersymbol interference of lithium ion screen precursor preparation data transmission is-10 × 10 dB, and the adaptive symbol transmission rate is 10 kBaud. according to the above parameters, a simulation model of data dynamic migration and information enhancement of lithium ion screen precursor preparation is constructed. The sampling time interval of the transmission symbol is 0.12 s, and the output of the dynamic migration of the preparation data of the lithium ion screen precursor is shown in Fig. 1.

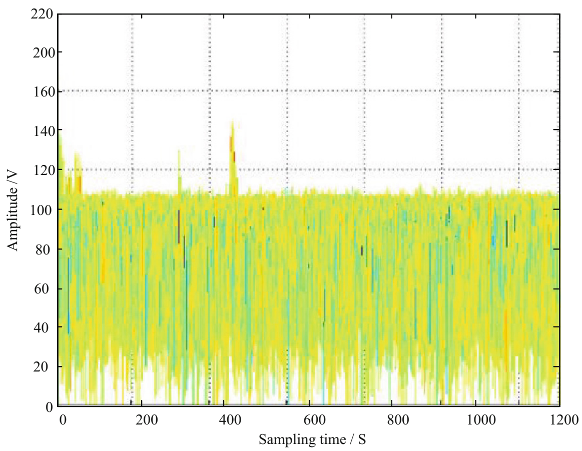

Fig. 1. Dynamic migration of preparation data of lithium ion screen precursors

Taking the data of Fig. 1 as the research object, the dynamic migration state characteristic of the preparation data of lithium ion screen precursor is extracted, and the Porter interval equilibrium method is used to control the dynamic migration of lithium ion screen precursor preparation data. The dynamic migration of data is realized, and the optimized preparation output is shown in Fig. 2.

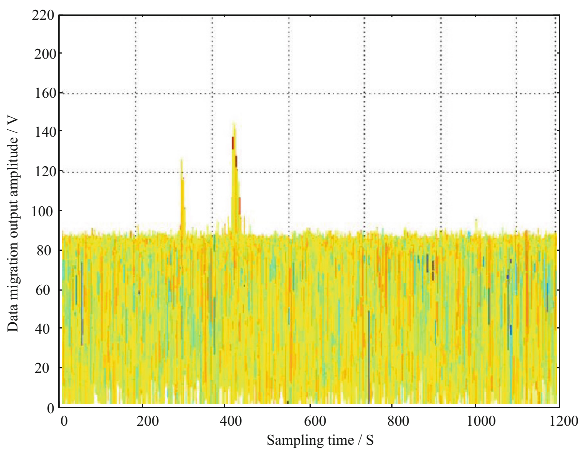

Fig. 2. Dynamic migration output of lithium ion screen precursor preparation data

Figure 2 shows that the output balance of dynamic migration of lithium ion screen precursor prepared by this method is better, the interference filtering performance is better, and the output bit error rate (BER) is tested. The comparative results are shown in Table 1, and the analysis shows that, in this paper, the output BER of dynamic migration of lithium ion screen precursors is low.

Table 1. Comparison of output BER

SNR/dB	Proposed method	Reference [3]	Reference [4]
−10	0.124	0.176	0.187
0	0.045	0.065	0.132
10	0	0.012	0.034

5 Conclusions

In this paper, an anti-interference high definition lithium ion screen precursor preparation data dynamic migration and information enhancement method based on dynamic migration equilibrium modulation is proposed. The dynamic migration transmission channel model of HD lithium ion screen precursor preparation is constructed, and the anti-interference design of HD lithium ion screen precursor preparation is carried out by using interference filtering algorithm. The dynamic migration state characteristic of the preparation data of HD lithium ion screen precursor is extracted, and the Porter interval equilibrium method is used to control the dynamic migration of HD lithium ion screen precursor preparation data. The dynamic migration optimization of preparation data of anti-interference HD lithium ion screen precursor is realized, and the anti-interference and safety of lithium ion screen precursor preparation are improved. The simulation results show that the preparation of HD lithium ion screen precursor by this method is safe and has strong anti-interference ability. The method has good application value in the preparation of lithium ion.

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References

1. Hao, S.G., Zhang, L., Muhammad, G.: A union authentication protocol of cross-domain based on bilinear pairing. J. Softw. **8**(5), 1094–1100 (2013)
2. Ma, Z., Chen, W.: Friction torque calculation method of ball bearings based on rolling creepage theory. J. Mech. Eng. **53**(22), 219–224 (2017)
3. Zhou, S.B., Xu, W.X.: A novel clustering algorithm based on relative density and decision graph. Control Decis. **33**(11), 1921–1930 (2018)
4. He, H., Tan, Y.: Automatic pattern recognition of ECG signals using entropy-based adaptive dimensionality reduction and clustering. Appl. Soft Comput. **55**, 238–252 (2017)

5. He, W., Tan, D., Kuang, H., et al.: Effect of yttrium barrier on the preparation of precursor powders of WC-Co cemented carbide and properties of sintered bulk. J. Alloy. Compd. **742**, S0925838818303979 (2018)
6. Wang, Z., Huang, M., et al.: Integrated algorithm based on density peaks and density-based clustering. J. Comput. Appl. **39**(2), 398–402 (2019)
7. Farnadi, G., Bach, S.H., Moens, M.F., et al.: Soft quantification in statistical relational learning. Mach. Learn. **106**(12), 1971–1991 (2017). https://doi.org/10.1007/s10994-017-5647-3
8. Tu, B., Chuai, R., Xu, H.: Outlier detection based on K-mean distance outlier factor for gait signal. Inf. Control **48**(1), 16–21 (2019)
9. Wei, X.S., Luo, J.H., Wu, J.: Selective convolutional descriptor aggregation for fine-grained image retrieval. IEEE Trans. Image Process. **26**(6), 2868–2881 (2017)
10. Tu, G.S., Yang, X.Y., Zohu, T.P.: Efficient identity-based multi-identity fully homomorphic encryption scheme. J. Comput. Appl. **39**(3), 750–755 (2019)
11. Ma, L., Zhang, T., Ma, D., Fu, Y.: Access network selection algorithm based on Markov model. Comput. Eng. **45**(5), 105–109 (2019)
12. Liu, S., Fu, W., Deng, H., et al.: Distributional fractal creating algorithm in parallel environment. Int. J. Distrib. Sens. Networks (2013). https://doi.org/10.1155/2013/281707