

1 **Electronic supplementary materials**

2 For <https://doi.org/10.1631/jzus.A2300006>

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4 **Biotreatment of incinerated bottom ash and biocementation of sand**
5 **blocks using soybean urease**

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Table S1 Determination of optimal soaking time for soybean powder.

Group No.	1	2	3	4	5	6
Soybean powder (g)	10	10	10	10	10	10
DI water (mL)	100	100	100	100	100	100
Soaking time (Minute)	10	30	50	70	90	120

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Table S2 Determination of optimal content for soybean powder.

Group No.	1	2	3	4	5	6	7
Soybean powder (g)	1	3	5	7	10	13	15
DI water (mL)	100	100	100	100	100	100	100
Soaking time (Minute)	30	30	30	30	30	30	30

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Table S3 Determination of optimal reaction time.

Group No.	1	2	3	4	5	6	7	8
Urea (mg)	110	110	110	110	110	110	110	110
SPF of 130 g/L (mL)	1	1	1	1	1	1	1	1
Nickel ions (mL)	10	10	10	10	10	10	10	10

Reaction time (h)	0	2	4	6	8	24	48	72
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Table S4 Determination of optimal content of SPF.

Group No.	1	2	3	4	5
Urea (mg)	110	110	110	110	110
SPF of 130 g/L (mL)	0.2	0.5	1	1.5	2
Nickel ions (mL)	10	10	10	10	10
Reaction time (hour)	24	24	24	24	24

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Table S5 Determination of optimal urea content

Group No.	1	2	3	4	5	6	7	8
Urea (mg)	10	30	50	70	90	110	130	150
SPF of 130 g/L (mL)	1	1	1	1	1	1	1	1
Nickel ions (mL)	10	10	10	10	10	10	10	10
Reaction time (hour)	24	24	24	24	24	24	24	24

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Table S6 Removal for different concentrations of nickel ions in solution under the best mass ratio

Group No.	1	2	3	4
Urea (mg)	1	5	10	25
SPF of 130 g/L (mg)	20	100	200	500
Nickel ions (mg)	2.4	12	24	60
Solution (mL)	20	20	20	20
Reaction time (hour)	24	24	24	24

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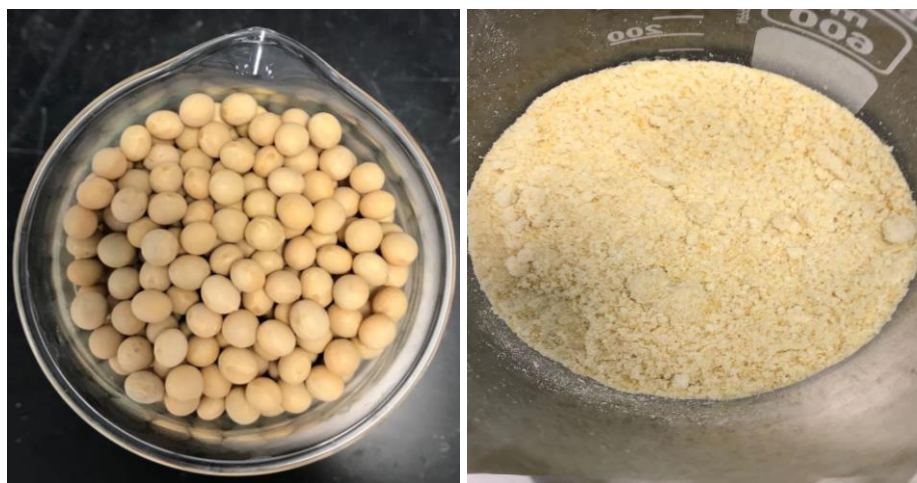
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27 **Table S7 Removal for different concentrations of nickel ions in solution eluted from IBA**
28 **under the best mass ratio**

Group No.	1	2	3
Urea (mg)	5	25	50
SPF of 130 g/L (mg)	100	500	1000
Nickel ions (mg)	12	60	120
Solution (mL)	100	100	100
Reaction time (hour)	24	24	24

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(a)

(b)

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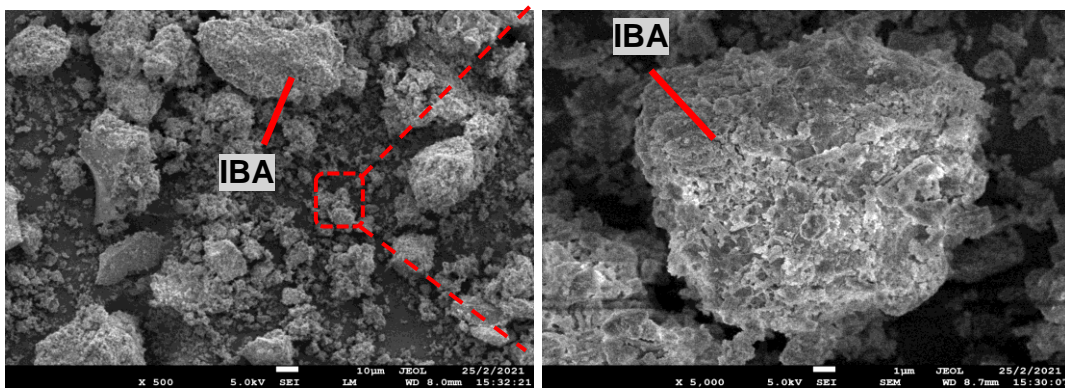
Fig. S1 Soybeans (a) and their powders (b).



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(a)



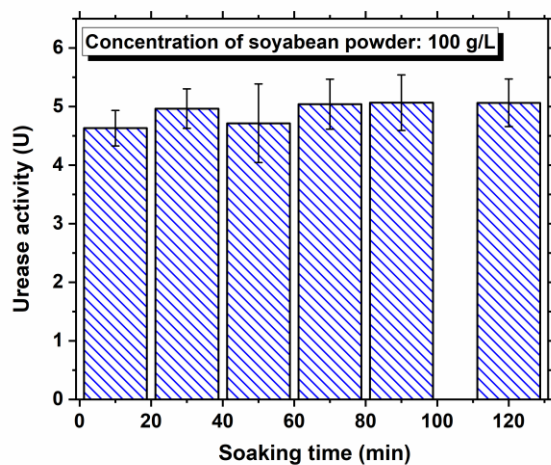
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(b)

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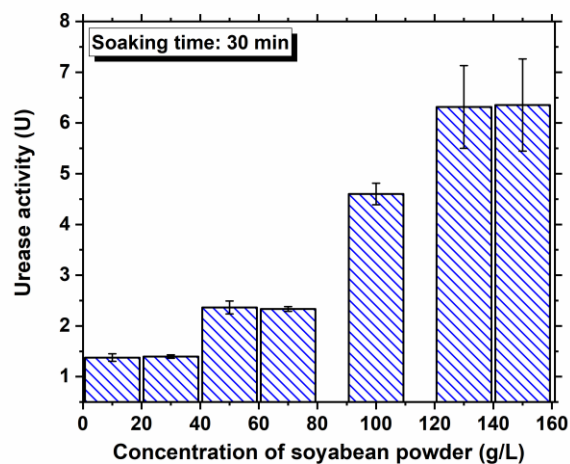
Fig. S2 Picture (a) and SEM images (b) of the IBA.



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40 **Fig. S3 Effect of soaking time on urease activity. Reprinted from (Yu and Pan, 2022),**

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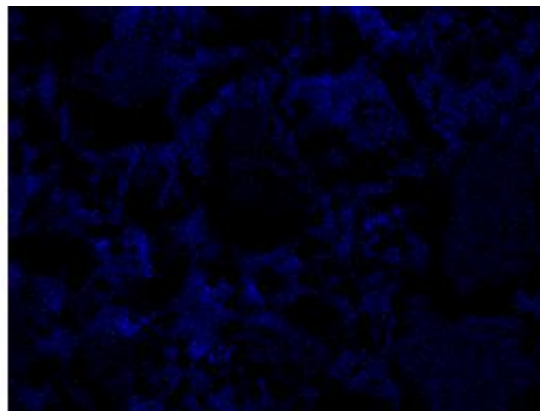
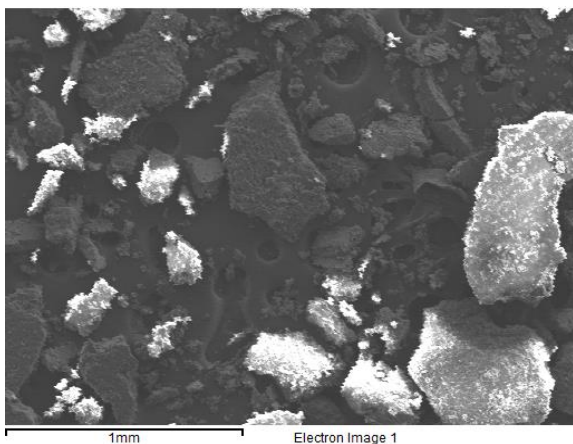
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43 **Fig. S4 Influence of concentration of soybean powder filtrate on urease activity. Reprinted**

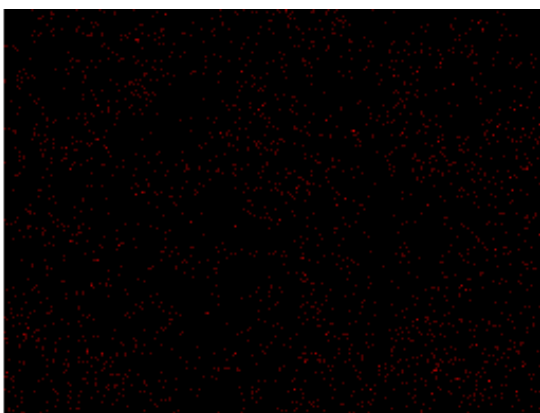
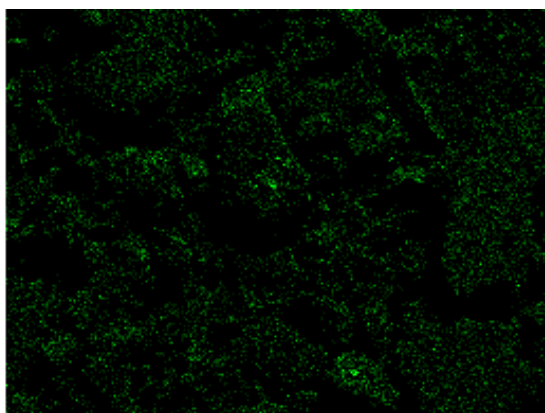
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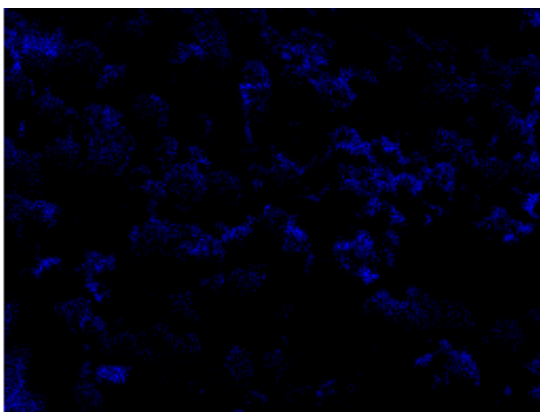
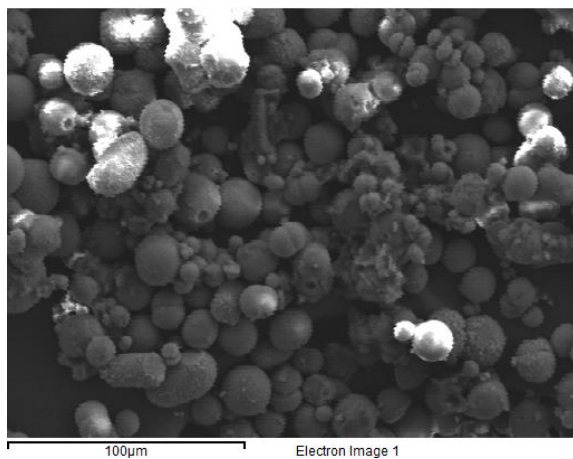
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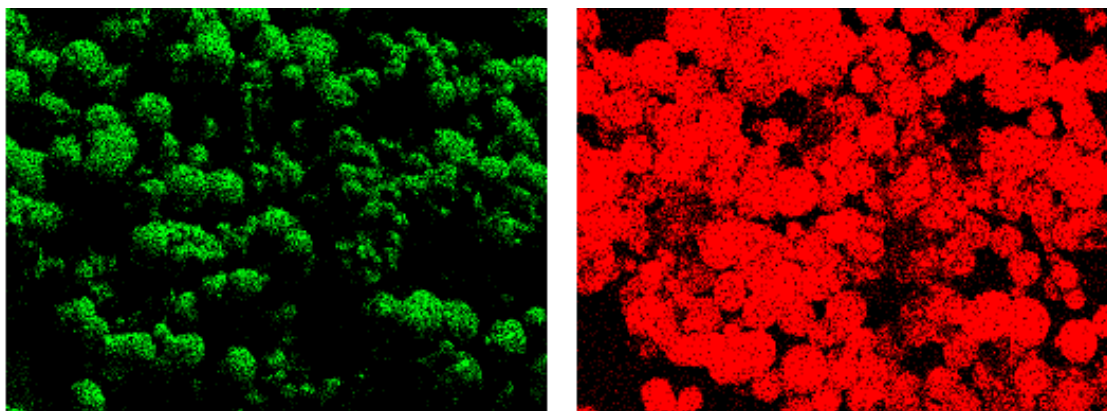


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Fig. S5 EDS images of nickel carbonate type compound.

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50 O Ka1

Ca Ka1

51 **Fig. S6 EDS images of calcium carbonate type compound**

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Fig. S7 Soybean powder filtrate

55 **Reference**

56 Yu X, Pan X, 2022. One-phase stabilization of sandy soil using seawater-based soybean induced
57 carbonate precipitation. *Journal of Sustainable Cement-Based Materials*, p.962-971.

58 <https://doi.org/10.1080/21650373.2022.2142985>