Claims

1. A method for lutein extraction comprising:

degumming silk materials in an aqueous phase to obtain a degumming solution and degummed silk materials;

separating the degummed silk materials from the degumming solution;

contacting ~~silk fibres~~the degumming solution and the degummed silk materials respectively with an ~~plurality of~~ extraction solvent~~s~~ to ~~obtain a first solution, the plurality of solvents comprising hexane, ethyl alcohol and ethyl acetate~~extract lutein from the degumming solution and the degummed silk materials;

~~partitioning the first solution into non-aqueous phase and an aqueous phase~~acquiring the contacted extraction solvent; and

drying the ~~non-aqueous phase~~contacted extraction solvent to obtain dried residue containing lutein~~;~~, wherein the extraction solvent is a mixture of hexane, ethanol and ethyl acetate respectively in a ratio of 3: 2: 1 by volume, wherein the silk materials are any one or combination of yellow silk cocoons, silk yarn, silk fibers and silk waste.

~~dissolving the dried residue with one or more of the plurality of solvents to obtain a second solution; and~~

~~filtering the second solution to obtain lutein extract therefrom.~~

2. The method as in claim 1, further comprising:

~~degumming at least one of silk cocoon, silk yarn and silk waste to obtain the silk fibres.~~dissolving the obtained dried residue to form a second solution; and

filtering the second solution to obtain purified lutein dissolved in the second solution.

3. The method as in claim ~~2~~1, ~~degumming at least one or silk cocoon, silk yarn and silk waste comprising:~~

~~soaking the at least one or silk cocoon, silk yarn and silk waste in water to obtain degumming solution; and~~

~~removing the degumming solution to obtain the silk fibres~~wherein the extraction solvent further comprises 0.1% (w/v) of butylated hydroxytoluene and/or butylated hydroxyanisole.

4. The method as in claim ~~3~~1, wherein the degumming ~~at least one or silk cocoon, silk yarn and silk waste further comprising~~: comprises heating of the silk materials and the ~~water-soaked at least one or silk cocoon, silk yarn and silk waste~~aqueous phase.

5. The method as in claim 1, ~~contacting silk fibres with the plurality of solvents comprising:~~
~~extracting a plurality of organic solution portions from the silk fibres by contacting the silk fibres with the plurality of solvents; and~~
~~pooling the plurality of organic solutions to obtain the first solution~~ wherein the acquiring contacted extraction solvent from the degumming solution comprises partitioning the extraction solvent and the aqueous phase.

6. The method as in claim ~~1~~5, wherein the partitioning ~~the first solution comprising:~~
~~adding aqueous sodium chloride to the first solution~~further comprises adding aqueous sodium chloride to the extraction solvent.

7. The method as in claim 1, wherein the drying of the ~~non-aqueous phase comprising:~~
~~separating the aqueous phase from the non-aqueous phase; and~~extraction solvent comprises adding anhydrous sodium sulfate to the ~~separated non-aqueous phase~~extraction solvent.
~~8. The method as in claim 7, drying the aqueous phase further comprising:~~
~~evaporating the separate aqueous phase to dryness.~~

~~9~~8. The method as in claim ~~1~~2, wherein the second solution is a mixture of ~~dissolving the dried residue comprising:~~
~~dissolving the dried residue in~~ hexane and ethyl acetate in a ratio of 3: 1 by volume.

~~10~~9. The method as in claim 1, filtering the second solution through a syringe filter.

~~11. A method for lutein extraction comprising:~~
~~degumming the silk cocoon to obtain silk fibres;~~
~~contacting the silk fibres with one or more solvents to obtain an first solution, the one or more solvents comprising hexane, ethyl alcohol and ethyl acetate;~~

~~partitioning the first solution into non-aqueous phase and an aqueous phase;~~
~~drying the non-aqueous phase to obtain dried residue;~~
~~dissolving the dried residue with hexane and ethyl acetate to obtain a second solution; and~~
~~filtering the second solution to obtain lutein extract therefrom.~~

~~12. The method as in claim 11, partitioning the first solution comprising:~~
~~adding aqueous sodium chloride to the first solution.~~

~~13. The method as in claim 11, drying the aqueous phase comprising:~~
~~separating the aqueous phase from the non-aqueous phase; and~~
~~adding anhydrous sodium sulfate to the separated non-aqueous phase.~~

~~14. The method as in claim 13, drying the non-aqueous phase further comprising:~~
~~evaporating the separated non-aqueous phase to dryness.~~

~~15. The method as in claim 11, dissolving the dried residue comprising:~~
~~dissolving the dried residue in hexane and ethyl acetate.~~

~~16. The method as in claim 11, filtering the second solution through a syringe filter.~~

~~17. A method for lutein extraction comprising:~~
~~contacting silk fibres with one or more solvents to obtain a first solution, the one or more solvents comprising hexane, ethyl alcohol and ethyl acetate;~~
~~partitioning the first solution into non-aqueous phase and an aqueous phase;~~
~~drying the non-aqueous phase to obtain dried residue;~~
~~dissolving the dried residue with the one or more solvents to obtain a second solution; and~~
~~filtering the second solution to obtain lutein extract therefrom.~~