

# GREEN TECHNOLOGY FOR THE PRODUCTION OF SELENIUM NANOPARTICLES USING COCOA WASTE

## PRODUCT DESCRIPTION

- For the first time, Selenium nanoparticles (SeNPs) is obtained using a novel phytochemical reduction of a selenium salt by the value-less waste of the strategic cocoa plant.
- The phytochemicals such as theobromine, besides different enzymes present in the cocoa pod husk (CPH) extract are hypothesized to reduce selenite into selenium nanoparticles.

## COMMERCIAL POTENTIALS

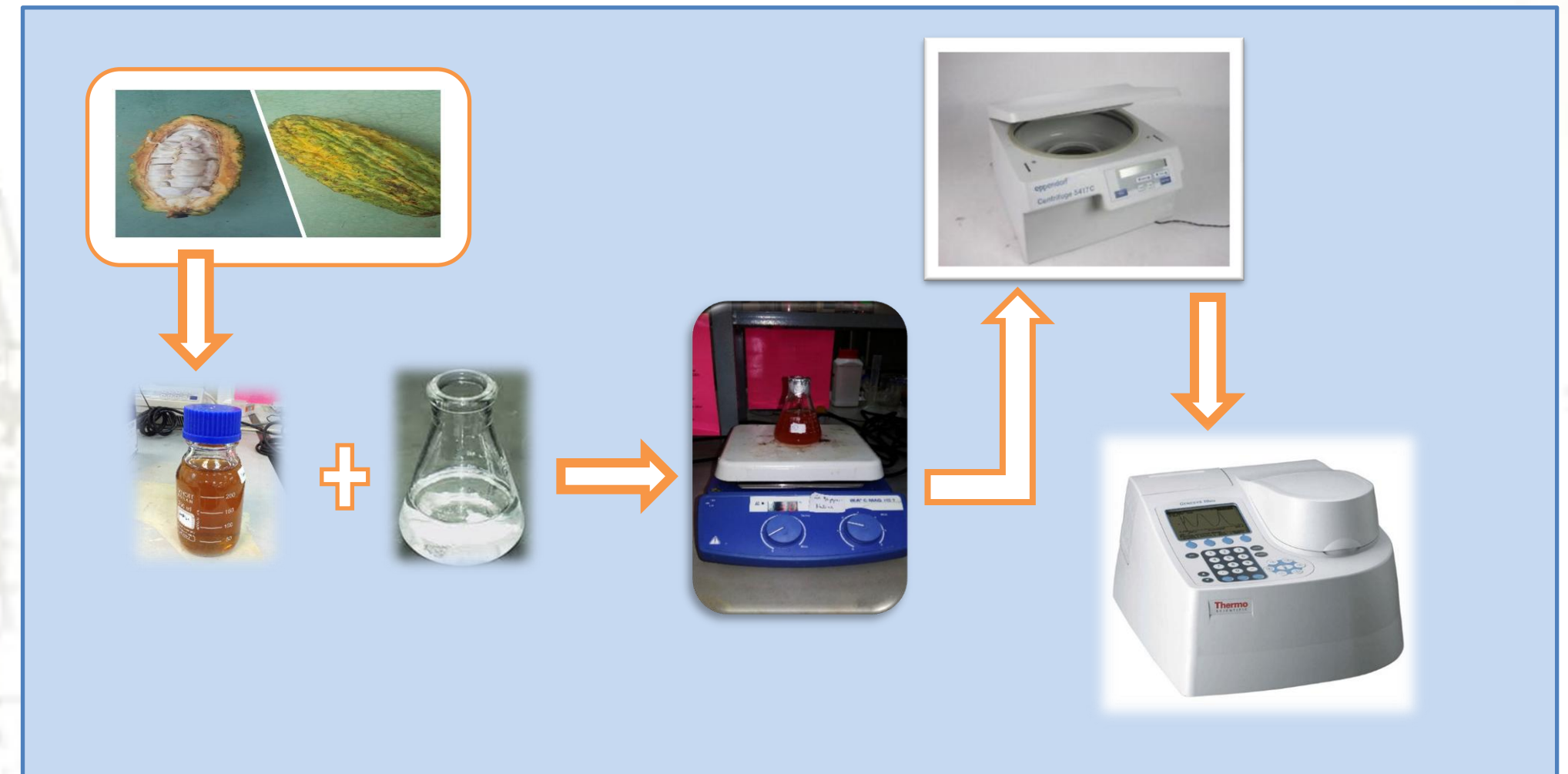
- Due to their unique property, SeNPs are photovoltaic and extensively used as semiconductor, antioxidant and chemoprotective agents.
- Plant mediated synthesis of SeNPs are less toxic than the existing chemical methods.
- Production of SeNPs from CPH extract also adds value to the cocoa industry and removes environmentally harmful waste at the same time.
- This method reduces the cost of the SeNPs production and promote its applications in diverse areas.
- Accordingly, biosynthesized SeNPs has promising potentials in industries.

## NOVELTIES

The produced SeNPs mediated by the plant extract is the first nanoparticle synthesized from cocoa pod husk.

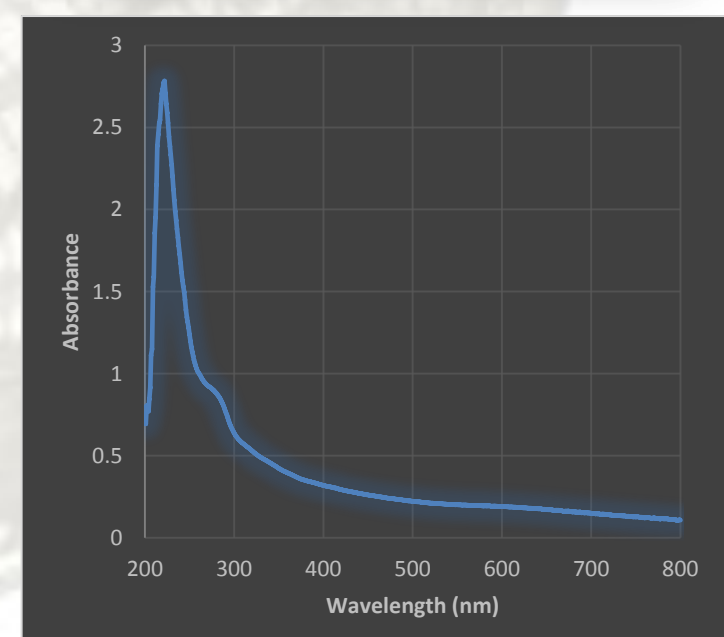
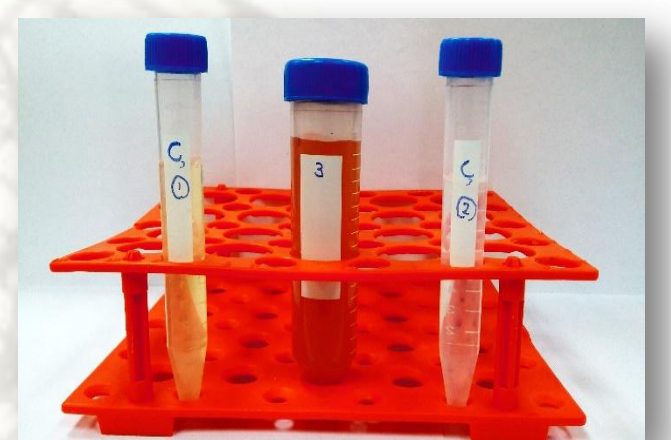
The method to produce SeNPs follows a green route since no toxic solvent has been used as reducing or capping agents.

## METHODOLOGY



## RESULT AND DISCUSSION

- Formation of SeNPs was detected by the change in the color of the reaction mixture from light brown to red and UV-vis spectroscopy characterization showed maximum absorption band at 222 nm which is in accordance with the literature.
- Factors such as salt and CPH extract concentration, the ratio of CPH extract to the salt solution, temperature and stirring time are very crucial in the formation of SeNPs and can reduce the time of the reaction.
- This measurement indicates that cocoa pod husk can mediate eco-friendly biosynthesis of SeNPs.



## CONCLUSION

This study shows that the value-less cocoa pod husk is able to reduce sodium selenite salt at the proper concentration to SeNPs. This green process can be easily adopted to industry scale production of selenium nanoparticles.