

# Synthesis and characterization of $\text{Ag}_2\text{ZnTiS}_4$ nanostructures prepared by hot-injection method towards low-cost electrocatalytic oxygen evolution

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## 1.1 Preparation of *Allium sativa* extract

### Sample collection and identification of Garlic bulb

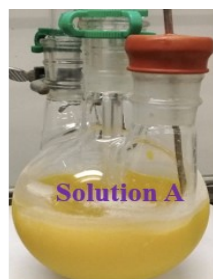
Fresh bulbs of Garlic, *Allium sativa* (Family Amaryllidaceae) were purchased from the main market in Rahim Yar Khan city, Pakistan. Identification and authentication of the Garlic was done in the Chemistry laboratory of Khwaja Fareed UEIT.

### Preparation of extracts

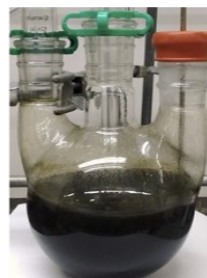
The collected bulbs were washed with distilled water, air-dried for one hour and grounded into a fine powder using a sterile pestle and mortar under laboratory conditions. This paste was mixed with 500ml of ethanol in a beaker and soaked for 3 days with intermittent shaking. The mixtures were filtered using fine cloth and saved for the preparation of targeted material.

## 1.2 Synthesis of $\text{Ag}_2\text{ZnTiS}_4$ nanostructures

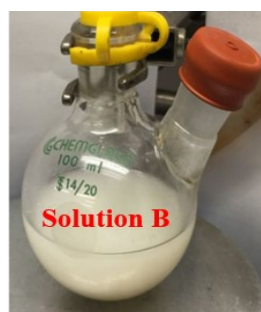
The change of color of the solution is presented in Figure S1 when respective salts were added to the *Allium sativa* extract and mixture stirred for one hour. After mixing both solutions the color of the solution is represented in Figure S2.



**Sodium sulfide,  
thiourea & garlic  
extract**



**Color after  
Stirring for 1 hr at  
50°C**



**zinc acetate, silver  
nitrate, titanium  
butoxide & & garlic  
extract**



**Color after  
Stirring for 1 hr at  
50°C**

Figure S1: Change in color of solutions A and B after stirring for one hour at 50°C



**Color of solution after  
mixing solution A and  
solution B at 100°C**



**Color of solution after  
two hours stirring at  
160°C**

Figure S2: Change in color of solutions after mixing solution A and solution B with stirring for two hours at 160°C

