ATS-JF060 Ir-ATO

Date: 2025-05-04
Tags: Ir ATO
Category: Synt Autoclave
Status: Success
Created by: Jonas Forner

Goal: Synthesis and analysis of Ir/ATO (50 wt%) (ATS-JF060)

Procedure:

Sample: ATS-JF060

1. The precursor solutions were prepared in the chosen solvent (H2O) with the following masses:
- 46.73 mg (0.157 mmol) of Ir(Cl) were dissolved in 5.00 mL of H2O. This corresponds to a metal concentration of 5.0 mg Ir / ml (31.30 mM).

The solutions were sonicated until the precursors were fully dissolved.

2. Calculated amounts of each stock solution were added to the reaction vessel:
The target composition was $Ir_{1.0}$.

- 1.000 mL of Ir(Cl) solution were added to the vial. This corresponds to 0.0260 mmol or 4.998 mg of Ir.

3. The 2.0 M reducing agent solution was prepared by dissolving 3999.70 mg of NaOH in 50.00 mL of H2O.
0.104 mL of the reducing agent solution were added to the vial, corresponding to 0.208 mmol (final concentration: 41.60 mM).

4. No capping agent was added to the reaction.

5. ATO was selected as support with a catalyst loading of 50 wt%. The overall theoretical weight of the nanoparticles
(assuming full reduction) was 5.0 mg. The amount of ATO that had to be added to reach the target loading was 5.00 mg.

6. The vial was filled to the final volume of 5.00 mL with 3.90 mL of H2O.

7. A stirring bar was added to the PTFE reaction vessel, which was then transferred into an autoclave reactor.
The reactor was filled around the vial with 15 ml of H2O and afterwards closed carefully.

8. The synthesis process was started. The reactor was heated to a final temperature of 175.0°C with a heat ramp rate of 2.0°C/min,
while stirring at 500.0 rpm. The temperature was held for 240.0 minutes. The reactor was then left to cool down to a reasonable
temperature before opening it. Any remaining pressure was released via the 3-way valve on the panel.
The reaction vessel was carefully retrieved.

9. The solution from the reaction vessel was transferred to a falcon tube. The nanoparticles were washed 2.0 times with 15.0 ml
of Milli-Q water and 2.0 times with 15.0 ml of ethanol. The solution was centrifuged every time at 6000.0 rpm
for 15.0 minutes. The initial supernatant was stored for ICP-MS analysis.

10. The sample was not dried and stored in ethanol until further use.

11. The sample was not heat treated.

Summary Table

Property	Value	Property	Value	Property	Value
Author	Jonas Forner	Sample:	ATS-JF060		
Nanoparticle Mass (mg)	5.0	Solution Concentration (mM)	5.2		
Molar Weight of Particles (w/o support) (g/mol)	192.22	Nanoparticle Moles (mmol)	0.0260		
Composition	$Ir_{1.0}$	Precursor Type	Cl		
Reducing Agent	NaOH	RA Concentration Factor	x 8	RA Concentration (mM)	41.6
Capping Agent	None	CA Concentration (wt%)	0.0		
Support	ATO	Support Loading (wt%)	50	Support Mass (mg)	5.0
Solvent	H2O	Final Volume (mL)	5.00		
Temperature (°C)	175.0	Ramp (°C/s)	2.0	Synthesis Time (min)	240.0
Stirring Rate (rpm)	500.0	Compound dried?	False		
Heat Treatment	None	HT Temperature (°C)	0	HT Duration (h)	0

The catalyst was dispersed in 2 ml of a 2:1 mixture of water:iPrOH, resulting in a metal concentration of 2.5 mg/ml.

extra_fields ⇒

Linked item

Project - DEMI

Attached files

ATS-JF060_recipe.tdms
sha256: a46252fb90851d57b55c7db0149f7d3e9235c6504be97c49f616a6f62c751796

ATS-JF060_recipe.txt
sha256: 3cea49792355e91513e27a2f6dd2846e073f4acfbe134852b9d880f42ec9498e

ATS-JF060_recipe.xdl
sha256: ad8e8f39cd4d038e1d9cbc835fcea014e0f5edb1c62c75f79f4127ffe7bef6fa

image.png
sha256: 566b969ac8aba2130c557092f8062ae8774812e53dd89a35dd5e26bf4ff488ce

Unique eLabID: 20250513-b7b9f7d9433d49df2ea2d3ab6d656fb0b6591f40
Link: https://elabftw.dcbp.unibe.ch/experiments.php?mode=view&id=6