# RECOVERABLE AND REUSABLE PALLADIUM NANOPARTICLE CATALYZED STEREOSELECTIVE ONE-POT SYNTHESIS OF 3-ARYLIDENE-2-OXINDOLES

**IITM Technology Available for Licensing**

## PROBLEM STATEMENT

- **Oxindoles** are organic compounds found in mammals' body fluids and tissues, and natural products of plants.
- **Used in traditional medicine** for various ailments including infection, cancer, gastric ulcers, arthritis, and mild physical inflammations.
- **Nintedanib, an oxindole derivative**, is approved to treat interstitial lung ailments like idiopathic pulmonary fibrosis and chronic fibrosis.
- **Other oxindole derivatives** include Sunitinib and Semaxanib, targeting angiogenesis colon-rectal cancer.
- **Synthesis of oxindole derivatives** is of great interest due to their wide-ranging biological importance.
- **3-arylidene-2-oxindoles** show better biological activity than unsubstituted oxindoles.
- **Previous synthetic methods** have major problems, such as the use of homogeneous **Pd-catalyst, expensive transition metal catalyst,** and the need for **Cu as an external oxidant**.

## TECHNOLOGY CATEGORY/ MARKET

**Technology:** Recoverable and Reusable Palladium Nanoparticle
**Category:** Chemistry & Chemical Analysis
**Industry:** Pharmaceutical,Chemical
**Application:** Medicinal, material, and natural product synthesis
**Market:** The global market size was valued at **USD 209.85 billion in 2019** and is poised to grow from **USD 222.4 billion in 2023 to USD 352.98 billion** by **2031, growing at a CAGR of 5.9%** in the forecast period **(2024-2031).**

## INTELLECTUAL PROPERTY

**IITM IDF Ref. 2328,Patent No: IN 547590**

## TRL (Technology Readiness Level)

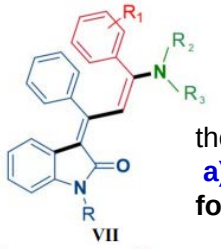
**TRL- 3**, Experimental Proof of concept

## Research Lab

**Prof.** Govindasamy Sekar**,**
**Dept**. of Chemistry

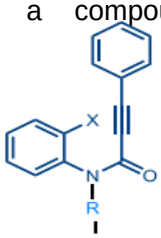
## TECHNOLOGY

A process for preparing a compound of **formula (VII)**



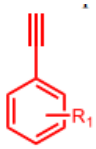
VII

the process comprising:
**a)** reacting a compound of **formula (I)**



I

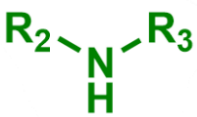
with compound of **formula (II)**



II

in presence of **palladium-binaphthyl nanoparticles (Pd-BNP)** and base in presence of solvent to obtain a reaction mixture,

**b) treating alcoholic solution** of secondary amine **(IIIa)**



IIIa

with the reaction mixture obtained **from step (a) to obtain a compound of formula (VII);**
wherein '**R**' is independently selected from a group comprising hydrogen, alkyl group, aryl group, acetyl group;
'**R1**' is independently selected from a group comprising **hydrogen and alkoxy group**;
'**R2'** is **hydrogen**;'**R3**' is **cyclohexyl;**
alternatively, '**R2' and 'R3' are connected to form**

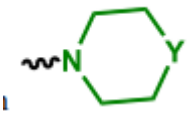


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**Figure 1 shows the Pd-BNP catalyzed one-pot synthesis of 3-arylidene 2-oxindole,**

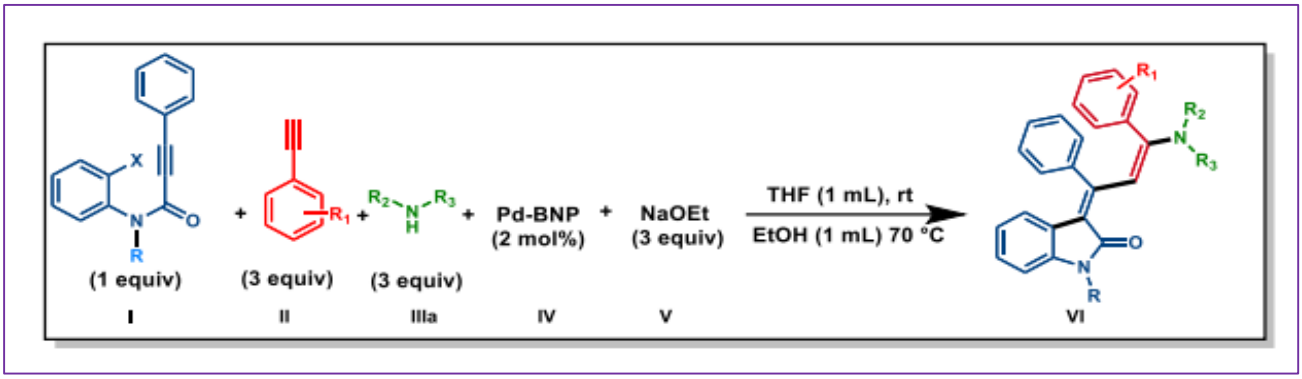
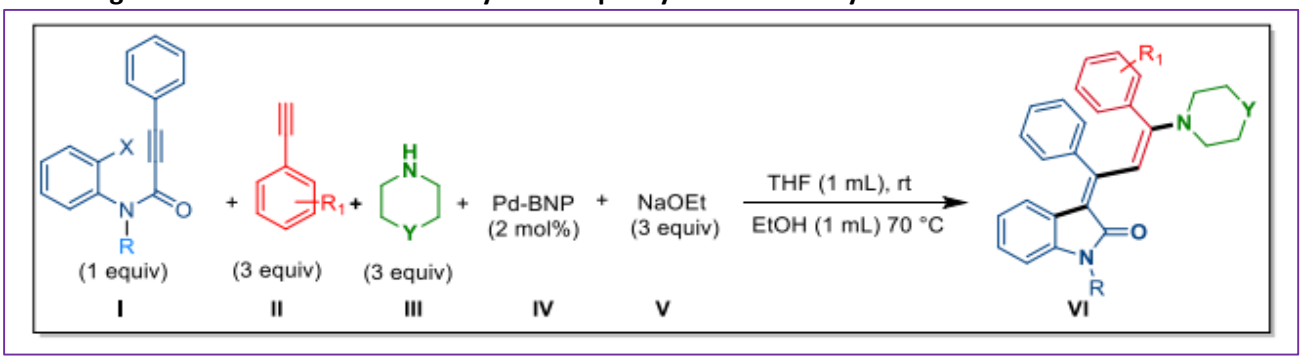



**Figure 2 shows the Pd-BNP catalyzed one-pot synthesis of 3-arylidene 2-oxindole**




## Key Features / Value Proposition

**Selection**

- **Alkyl, alkoxy, n-alkyl, aryl**, and secondary amine are selected from various groups.

**Secondary amine**

- The **alcoholic solution** of **secondary amine** is either **methanolic or ethanolic**.
- Secondary amine is selected from morpholine, piperidine, pyrrolidine, **4-methylpipridine, and cyclohexanamine.**

**Solvent**

- The solvent used in step (a) is tetrahydrofuran, **cyclic ether, ethanol, methanol, 1,4-dioxane, toluene**, and combinations thereof.

**Temperature**

- The process is carried out at **room temperature** and step (b) at a temperature range of **50℃ to 90℃,** preferably around **70℃.**

**Time**

- The process is carried out for **4 hours to 8 hours**, preferably **6 hours**, and **1 hours to 3 hours,** preferably **2 hours**

**Base**

- **Sodium ethoxide, sodium methoxide,dimethylamine,diisopropylamine,diisopropylethylamine**, triethylamine, and potassium carbonate.
- The process includes **isolation and/or purification** of the corresponding product.

**Recoverable, reusable**

- Synthesize oxindole derivatives using **recoverable, reusable** heterogeneous **palladium catalysts**.
- Develop a method for synthesizing oxindole derivatives using a **transition metal catalyst**.

**Applications**

- **Avoid external oxidant** use of copper and metal impurity in final product.
- Crucial due to widespread **applications in medicinal, material, and natural product synthesis.**

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