



A Conducting Electrochromic Composite of Metallic Nanowires And Multi-Coloured Thermochromic Materials

IITM Technology Available for Licensing

Problem Statement

- Current electrochromic materials, particularly metal oxides and conducting polymers, involve **complex deposition processes** and **limited flexibility**, making it **costly** to **manufacture** and inflexible for various uses.
- Existing devices **lack diverse color variations**, restricting their adaptability to meet the demands for a **broad spectrum** of colors in electrochromic applications.
- Conventional electrochromic devices need a **multi-layered structure & specific electrode layers**, which inherently **limit flexibility** and **ease of production**, leading to complex design & fabrication.
- Hence, there is a need for a **cost-effective, easy to manufacture** an **electrochromic composite** which is flexible & made of a conducting material.

Technology Category/ Market

Advance Material & Manufacturing | Chemistry & Chemical Analysis

Industry: Electronics Smart Devices, Manufacturing & Coatings, Textile Industry

Applications: Customizable Surfaces, Smart Windows & Glass, Consumer Electronics, Architectural Coatings, Display Technology

Market: The global Electrochromic Materials Market size is forecast to reach **\$1,910.3 million by 2025**, after growing at a **CAGR of 6.9% during 2020-2025**.

Research Lab

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Intellectual Property

IITM IDF No: 2032 | **IP No:** 401967 (Granted)
PCT: PCT/IN2021/050569

Technology

The present patent invention discloses a **conducting electrochromic composite** comprising of metallic (**silver**) **nanowires**, **thermochromic material**, and optionally a **conducting polymer**. **FIG 1** depicts the drop cast patterns of the thermochromic nanowire composite ink in different colours. Colour changes to white with voltage supply & returns to its original colour once voltage is removed.



TRL (Technology Readiness Level)

TRL – 4; Experimentally validated in lab.

Key Features / Value Proposition

- The composite is a **flexible conducting material**, relatively **easy to manufacture** and of **low-cost**, easy to **cast & drop**.
- The conducting electrochromic composite comprises **4-6 wt%** of **metallic nanowires**, **2-6 wt%** of **thermochromic material** selected from a material that **reversibly changes its colour** with temperature, and optionally 10-15 vol% of conducting polymer.
- The **final material is prepared in a dispersion form**, for easy application over the substrate using any **conventional solution-based deposition techniques**.
- A **single layer deposition is sufficient**, without needing any complex multi-step deposition processes currently in use to **fabricate electrochromic devices**.
- Dispersion has **very low post-deposition annealing** requirements (100 °C for 1 h).
- **Support multiple colors** and can be **controlled** by the **applied voltage**.

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