NEW FINDINGS OF DOCTORAL DISSERTATION

Name of Doctoral candidate: Viet Nguyen Ngoc

Dissertation tittle: "***Research and preparation of pure ZrO_2 and $ZrOCl_2$ from Viet Nam zircon ore concentrate oriented toward catalytic material applications"***

Speciality: Theoretical and Physical Chemistry Code of speciality: 9.44.01.19.

Name of academic advisors: Prof. PhD Thu Ha Vu Thi

Name of academic institution: Vietnam Institute of Industrial Chemistry

Summary of new findings of the dissertation

1. The chemical composition, mineralogical composition, and phase structure of selected Vietnamese zircon concentrates samples were characterized, providing a scientific basis for selecting and optimizing processing routes suited to domestic raw materials. Suitable conditions were established for the decomposition of zircon concentrate with KOH using the sub-molten salt (SMS) method, achieving a $ZrSiO_4$ decomposition efficiency of 99.08%.

2. A process for the advanced processing of Vietnamese zircon concentrate was developed using the KOH–SMS method, followed by leaching, recovery, and purification to produce high-purity $ZrOCl_2$ and ZrO_2 with a purity of 99.57%. These results strengthen the scientific and experimental basis for converting zircon into high-purity zirconium compounds and support the development of value-added products from domestic mineral resources.

3. $ZrOCl_2$ prepared from Vietnamese zircon concentrate was used in a preliminary study to synthesize Mg–Zr perovskite catalytic materials and assess their potential for converting lipid feedstocks with a high free fatty acid content into biodiesel. Under the conditions investigated, the product had an ethyl ester content exceeding 94%. These preliminary findings demonstrate the potential of zirconium products derived from domestic mineral resources as precursors for catalytic materials, linking advanced zircon processing with biofuel production.

Ha Noi, 18th November, 2026

Academic advisors	**Doctoral candidate**
Prof. PhD Thu Ha Vu Thi	**Viet Nguyen Ngoc**