Research Statement

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RESEARCH FOCUS

I design nanoscale carriers for targets that are hard to reach, and I test them to the point where the claim survives an animal model. The recurring question in my work is not whether a compound is potent but **whether enough of it arrives, in the right place, in the right form** — which is the question your group asks of every barrier it works on.

DOCTORAL WORK

At the Shanghai Institute of Materia Medica, Chinese Academy of Sciences, I built a **mesoporous polydopamine-based Pickering emulsion** co-loading two agents with opposite formulation requirements — shikonin, a poorly soluble naphthoquinone that inhibits PKM2, and JQ1, a BET bromodomain inhibitor. Separate administration loses the ratio; a single particle holds it to the point of release.

In triple-negative breast cancer models the system suppressed primary tumour growth and lung metastasis. Mechanistically it induced **apoptosis** while blocking **epithelial–mesenchymal transition** and **vasculogenic mimicry** — three independent escape routes closed simultaneously. Published in *Acta Pharmacologica Sinica* 46(12):3314-3326, **joint first author, equal contribution formally recorded**. I later incorporated the formulation into a thermosensitive hydrogel for the post-surgical window.

I also hold a filed Indian patent (No. 202421042057) for a transdermal system, taken from concept through skin permeation and in vivo safety evidence to filing — a second barrier, and a reminder that a delivery result only counts when someone outside the laboratory can read the evidence.

WHAT I WOULD PROPOSE

Validating targeting at the level of the cell type, not the organ. Biodistribution measured per organ is the standard readout and it hides the failure that matters — a particle can accumulate in a tissue and never enter the intended cell. Combining confocal localisation with flow-cytometric quantification of uptake by cell type would make that distinction routine.

Multivalency against a moving target. My doctoral result argues that closing one escape route is rarely enough. Applied to targeted nanodevices, the interesting question is whether one particle can engage two mechanisms rather than one ligand engaging one receptor better.

Carriers for the post-surgical window, where local sustained release is better suited than systemic dosing and where the delivery constraints are unusually clean.

CAPABILITY AND LIMITS

Capability: carrier design and optimisation; DLS, zeta potential, TEM, SEM, HPLC, UV–Vis; cellular uptake, viability and apoptosis assays, confocal and fluorescence imaging, flow cytometry, Western blot, RT-qPCR, ELISA, immunofluorescence and immunohistochemistry; and the full murine in vivo programme run independently.

Limits: no blood–brain barrier, retinal or biofilm work; no enzyme or nucleic-acid payloads; no nanomotor or device fabrication. These are the parts I would be learning.

RECORD AND FUNDING

Seven peer-reviewed publications, 324 citations, h-index 3 (Google Scholar, July 2026); three as first or joint first author. One filed patent. Doctorate funded throughout by the ANSO Young Talent and Belt and Road Government Fellowships. Eligible for MSCA (2026 call closes 9 September) and Juan de la Cierva – Formación; not yet eligible for la Caixa Junior Leader, which requires a PhD two to seven years old.