



RUTGERS

Monday Mid-day Meet & Eat Seminar – Remote

Center for Dermal Research Welcomes

Sandeep Kulkarni, Founder & CEO, ImageProVision

“AI-Enabled Morphological Analysis for Globule Characterization and API Differentiation in Complex Semisolid Drug Products”

Abstract:

Semisolid pharmaceutical formulations, like creams, gels, and ointments, pose unique analytical challenges due to their complex, multi-phase nature. Traditional particle size analysis often relies on bulk measurements and overlooks critical attributes such as particle morphology, globule distribution, and the distinction between active pharmaceutical ingredients (APIs) and excipients. This research explores AI-driven, microscopy-based particle morphology analysis for the characterization of semisolid systems. By leveraging image-based analysis, this approach allows direct visualization and measurement of individual particles and globules, providing detailed insights into size distribution and structural characteristics. The methodology focuses on two key aspects: (i) accurate globule size identification in emulsions and (ii) morphology-based differentiation of APIs within complex semisolid matrices. Case studies reveal the ability to detect non-uniformity, coalescence, and early-stage instability in formulations and to distinguish multiple APIs based on morphology. The results demonstrate how AI-enabled image analysis overcomes conventional technique limitations by providing particle-level classification and enhanced data traceability. This approach supports better formulation development, quality control, and regulatory compliance by deepening the understanding of critical quality attributes (CQAs) in semisolid drugs. Overall, integrating AI-driven morphology analysis into workflows offers a more reliable framework for optimizing complex pharmaceutical formulations.

Biography:

Sandeep Kulkarni, a Mechanical Engineer from National Institute of Technology with a management program from India Institute of Management Ahmedabad and a course in Image Processing from Duke University, has over 31 years of experience across various industries. He has held senior leadership roles and successfully established multiple greenfield manufacturing units, specializing in manufacturing operations, IT systems, and ERP implementations. After 22 years in the corporate sector, he founded ImageProVision, an innovative company in intelligent image analytics, focusing on AI-driven microscopic particle analysis for pharmaceuticals. Mr. Kulkarni has multiple patents in image-based particle analysis and has received accolades, including the India Pharma Award for Most Innovative Product (CPHI 2015) and recognition as a Top 50 Emerging Tech Company by NASSCOM. A dedicated mentor, he actively shares knowledge across disciplines. ImageProVision has offices in Princeton, Pune, and Hyderabad.

May 18, 2026

12:00pm EST



Sandeep Kulkarni,
Mechanical
Engineer, and
Entrepreneur

Direct online
seminar link



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