Ultramikro LLC

ACS

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Scott Aldrich Experience

- Ultramikro LLC: 2006-present
- 35 years with Upjohn-P&U-Pharmacia-Pfizer
  - Contamination analyses, Process control, Product Design
    - Commercial products
    - R&D - Development
- Applications for pharmaceutical, food and commercial packaging products.
- Expert in particulate matter identification
- Member of the USP Parenteral Products-Industrial expert committee for the 2005-2010 cycle.
- USP Dosage Forms EC 2010-2011 cycle
- ACS, AAPS, PDA, USP, Microscopy society affiliations

Getting Started

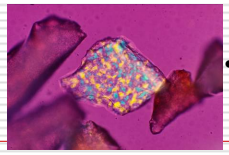
- What is it you want to do?
- The amount of need-to-do will change the scope
  - Many jobs won't your ideal
- What's your mission-vision?
- Name yourself
- Incorporate
- Insure yourself
- Network!

Ultramikro - Whole Program

- Microscopy Training
  - The approach….
- USP methods Training
- Systems Training
  - Visual inspection
  - Part matter evaluation
  - Stability testing
  - Triage – character - ID
  - Particle remediation via process reviews

The Nature (or State) of Material

- Association
  - Singular
    - Liquid
    - Solid
    - Combinations
  - Multiple
    - Aggregate/Agglomerate
      - no distinct boundaries (matrix evident?)
      - boundaries?
      - with similar material, foreign material?
      - Groups of groups?
      - Homogeneous heterogeneity?
    - Polycrystalline
    - Microcrystalline
    - Cryptocrystalline
  - Layered
  - Coated



- Crystallinity
  - None Evident
    - Amorphous
      - Methods?
  - Evident -or- Continuum
    - "Liquid": 2-D order
    - Solid: 3-D order
      - Isometric (1 ri)
      - Uniaxial (2 ri)
        - Tetragonal
        - Hexagonal (trigonal)
      - Biaxial (3 ri)
        - Orthorhombic
        - Monoclinic
        - Triclinic
  - Sub-optimal solid state

Clean & Stable

- Quality by Product Design and Assembly
  - Clean
    - Cosmetic defects controlled
    - Particulate matter defects low, tracked
    - Extraneous matter investigated
  - Stable
    - Products ends shelf as it began
- Development Activities
- Commercial Product

PARTICULATE MATTER ORIGINS

- ADDITIVE/EXTRINSIC
  - Single event/Unchanging
    - *-environmental*
    - *-machine*
    - *-personnel*
    - *-inadequate prep/cleaning*
    - *-closure source*
- INTRINSIC/MULTIPLE EVENT
  - GROWTH/INTRINSIC/CHANGING
    - Package Change
    - Leaks
    - Ingredient purity/change
    - Active purity/change
    - Product-Package interaction
- CHANGE MECHANISMS
  - Coalescence
  - Sedimentation
  - Nucleation
  - Crystallization
    - Hydrate Formation
    - Solvate Formation
    - Polymorphism
    - Salt Formation
  - Degradation
    - Chemical
    - Physical Effects
      - Temperature
      - Shear
      - Light
  - Oxidation
  - Oligomerization
  - Impurities
  - Drug Concentration Effects/Micelles
  - Leaching/Extraction