Materials Characterization - Video course

COURSE OUTLINE

Scope of optical metallographic studies: Image formation, resolving power, numerical aperture, empty magnification, depth of focus, components of microscopes, important lens defects and their correction, principles of phase contrast, interference and polarized light microscopy, elements of quantitative metallography and image processing, sample preparation techniques.


Studies by electron microscopes: Construction and working principles of transmission electron microscopes. Image formation, resolving power, magnification, depth of focus, elementary treatment of image contrasts, important lens defects and their correction. Bright field and dark field images. Stereographic projection and their applications. Formation of selected area diffraction patterns, reciprocal lattice and Ewald sphere construction, indexing of diffraction patterns, sample preparation techniques. Scanning electron microscope; construction, interaction of electrons with matter, modes of operation, image formation of plane and fractured surfaces.

COURSE DETAIL

<table>
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<tr>
<th>Sl. No</th>
<th>Topic</th>
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| Module 1 | 1. Fundamentals of optics  
2. Optical microscope and its instrumental details  
3. Variants in the optical microscopes and image formation |
| Module 2 | 4. Phase contrast, Polarised light, Differential interference contrast, Fluorescence microscopy  
5. Sample preparation and applications |
| Module 3 | 6. Introduction to Scanning electron microscopy  
7. Instrumental details and image formation  
8. Various imaging techniques and spectroscopy  
9. Sample preparation and Applications |
| Module 4 | 10. Introduction to X-ray diffraction  
11. Instrumental details and analysis of XRD pattern  
12. Residual stress measurements |
| Module 5 | 13. Introduction to Transmission electron microscopy (TEM)  
14. Science of Imaging and diffraction  
15. TEM instrumental details and variants in imaging techniques  
16. Sample preparation procedures and instruments for various materials |

References:


9. www.microscopyu.com


