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Module Type_definitions_mod


  Use Definitions_mod

  !----------------------------------------------------------------------------
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  ! LAL nov 2008: Variable and type definitions for read_param_new


    Type :: Global_type
       Character(len=200)          :: Title
    End Type Global_type


    Type :: Source_Der_type
       Real(wp)                    :: Theta0_calc        ! Polarization dependent
, se Set_Derived_Params (deg)
       Real(wp)                    :: Phi0_calc          ! Parameters for calc: a
ngle between field and substrate (deg)
    End Type Source_Der_type

    Type :: Source_type
       Real(wp)                    :: Theta0             ! Incident angle of ligh
t (deg)
       Real(wp)                    :: Phi0               ! ??
       Real(wp)                    :: Energy_Range(2)    ! Photon energy range (e
V)
       Character(len=1)            :: Polarization       ! Polarization of the in
cident beam
       Type(Source_Der_type)       :: Derived
    End Type Source_type


    Type :: Island_Der_type
       Character(len=10)           :: Geometry           ! (island, thin_cap ...
more to come?)
       Real(wp)                    :: Contact_Angle      ! Contact angle between
island and substrate
       Real(wp)                    :: Radius_Apparent    ! Apparent island radius
 (nm)
       Real(wp)                    :: Radius_Mean        ! Mean radius (nm)
       Real(wp)                    :: Div_Surface        ! Position of the dividi
ng surface (nm)
       Real(wp)                    :: Truncation_Ratio_Coating ! Truncation ratio
 for sphere with coating
       Real(wp)                    :: RadiusC            ! Radius of sphere coati
ng
    End Type Island_Der_type

    Type Island_type
       Real(wp)                    :: Radius             ! Island radius (nm)
       Real(wp)                    :: Truncation_Ratio   ! Truncation Parameter
       Real(wp)                    :: Coating_Thickness  ! Coating Thickness (nm)
       Character(len=15)           :: Size_Distribution  ! Type of Size distribut
ion probability : log-normal,gaussian, gate
       Type(Island_Der_type)       :: Derived
    End Type Island_type


    Type :: Interaction_Der_type
       Real(wp)                    :: Density            ! Surface density of isl
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ands
       Real(wp)                       :: Cluster_Volume     ! Volume of the cluster
       Real(wp)                       :: Cluster_Surface    ! Surface of the cluster
       Real(wp)                       :: Cluster_Shape_Ratio! Aspect ratio of the cl
uster
    End Type Interaction_Der_type

    Type :: Interaction_type
       Character(len=20)              :: Arrangement        ! ??
       Character(len=20)              :: Lattice_Type       ! (square, hexagonal, MF
T, RPT)
       Real(wp)                       :: Lattice_Constant   ! Lattice constant (nm)
       Real(wp)                       :: Coverage           ! Island coverage (dimen
sionless)
       Type(Interaction_Der_type)     :: Derived
    End Type Interaction_type


    Type :: Film_Der_type

    End Type Film_Der_type

    Type :: Film_type
       Real(wp)                       :: Thickness
       Type(Film_Der_type)            :: Derived
    End Type Film_type


    Type ::Materials_Der_type

    End Type Materials_Der_type

    Type :: Materials_type
       Character(len=10)              :: Ambient_Material
       Character(len=10)              :: Island_Material
       Character(len=10)              :: Substrate_Material
       Character(len=10)              :: Film_Material
       Character(len=10)              :: Coating_Material
       Character(len=10)              :: Finite_Size_Effects
       Character(len=200)             :: Database_Path
       Type(Materials_Der_type)       :: Derived
    End Type Materials_type


    Type :: Numerics_Der_type
       Integer(wpi)                   :: m                  ! Calcuation order (m=1
for dipole, m=2 for quadropole)
       Logical(lgt)                   :: Above              ! MP above substrate?

    End Type Numerics_Der_type

    Type :: Numerics_type
       Integer(wpi)                   :: Multipole_Order    ! Number of mulipoles
       Real(wp)                       :: Multipole_Position ! Position of the multip
oles
       Integer(wpi)                   :: No_Energy_Points   ! Number of energies
       Character(len=20)              :: Island_Island_Interaction
       Type(Numerics_Der_type)        :: Derived
    End Type Numerics_type


    ! Not given in input.dat, but set in Initialize.f90
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    Type:: Misc_type
     ! I/O
        Character(len=20)           :: Fresnel_DR_Formulae! Type of formulae for D
R
        Character(len=5)            :: Output_Type        ! Nature of output
        Logical(lgt)                :: Output_Strenght    ! Output for the multipo
le coefficients
        Logical(lgt)                :: Output_Polarizability ! Output for the pola
rizabilities
        Logical(lgt)                :: Normalization      ! Normalization by the v
olume for the polarizability
        Character(len=100)          :: Outfilename        ! Output filename (basen
ame)
        Character(len=100)          :: Infilename

     ! Size distribution parameters
        Real(wp)                    :: Distribution_Sigma ! Standard deviation of
size distribution
        Real(wp)                    :: Distribution_xRmin ! Minimal radius of isla
nd
        Real(wp)                    :: Distribution_xRmax ! Maximal radius of isla
nd
        Integer(wpi)                :: Distribution_Classes ! Number of radius cla
sses

     ! Numerics
        Integer(wpi)                :: Levels             ! Number of levels used
in the lattice sum

     ! Some control Parameters for the metal
        Character(len=10)           :: Mean_Free_Path     ! Nature of mean free pa
th 'none' 'finite_Size' 'manual'
        Logical(lgt)                :: Surface_Effects    ! Surface effects
        Real(wp)                    :: Temperature        ! Temperature (K)
        Logical(lgt)                :: Thermoreflectance  ! Thermoreflectance

     ! Control Parameters for the boundary conditions
        Character(len=10)           :: Bound               ! Type of calculation (
none-BC-Pot)
        Real(wp)                    :: BC_Energy           ! Energy for the calcul
ation
        Character(len=15)           :: Scaling             ! Nature of the scaling
 Parameter : none,incident_field,mean_value

     ! Some physical constants
        Real(wp)                    :: Eps_vacuum
        Real(wp)                    :: hbar                ! Plancks constant (eV
s)
        Real(wp)                    :: c                   ! Speed of light
        Real(wp)                    :: me                  ! Mass of the electron
in eV.nm-2.s2

     ! Various Parameters
        Real(wp),      Pointer, Dimension(:)  :: Energy
        Complex(wpc), Pointer, Dimension(:)  :: Eps_Island
        Complex(wpc), Pointer, Dimension(:)  :: Eps_Island_File
        Complex(wpc), Pointer, Dimension(:)  :: Eps_Substrate
        Complex(wpc), Pointer, Dimension(:)  :: Eps_Substrate_File
        Complex(wpc), Pointer, Dimension(:)  :: Eps_Coating


     ! Convolution parameters(?)
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      Real(wp)    :: sigEpar             ! Parallel and perpendicular values of
the convolution width (eV)
      Real(wp)    :: sigEperp


   End Type Misc_type


   Type :: Parameters_type
      Type(Global_type)        :: Global
      Type(Source_type)        :: Source
      Type(Island_type)        :: Island
      Type(Interaction_type)   :: Interaction
      Type(Film_type)          :: Film
      Type(Materials_type)     :: Materials
      Type(Numerics_type)      :: Numerics
      Type(Misc_type)          :: Misc
   End Type Parameters_type

   Type(Parameters_type)       :: param_new


 !-----------------------------------------------------------------------------
---------------
 Type surface_constitutive
    Complex(wpc)  :: gamma
    Complex(wpc)  :: beta
    Complex(wpc)  :: delta
    Complex(wpc)  :: tau
 End Type surface_constitutive

 !-----------------------------------------------------------------------------
---------------
 Type invariants
    Complex(wpc)  :: e
    Complex(wpc)  :: delta_e
    Complex(wpc)  :: tau
    Real(wp)      :: c
 End Type invariants

 !-----------------------------------------------------------------------------
---------------
 Type mumubar
    Real(wp):: mu(2)    ! 1:mu  2:mubar
 End Type mumubar

 !-----------------------------------------------------------------------------
---------------
 Type Integrals
    Real(wp)       ::      Q
    Type(mumubar)  ::      K
    Type(mumubar)  ::      L
    Type(mumubar)  ::      M
    Type(mumubar)  ::      N
 End Type Integrals

 !-----------------------------------------------------------------------------
---------------
 Type Polynomials
    Real(wp)       ::      P         !   P(l,m)(x)
    Type(mumubar)  ::      PP        !   P(l,m)(chi)
    Type(mumubar)  ::      dPdx      !   dP/dx(l,m)(chi)
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  End Type Polynomials

  !---------------------------------------------------------------------------
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End Module Type_definitions_mod
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