

## Physical Properties of Common Inorganic Scintillators

| Scintillator                                                        | Light yield (photons/keV) | Light output (%) of NaI(Tl) bialkali pmt | Temperature coefficient of light output (%/C) 25°C to 50°C | 1/e Decay time (ns) | Wavelength of maximum emission $\lambda_m$ (nm) | Refractive index at $\lambda_m$ | Thickness to stop 50% of 662 keV photons (cm) | Thermal expansion (/C) $\times 10^{-6}$ | Cleavage plane | Hardness (Mho) | Density g/cm <sup>3</sup> | Hygroscopic | Comments                                                                                       |
|---------------------------------------------------------------------|---------------------------|------------------------------------------|------------------------------------------------------------|---------------------|-------------------------------------------------|---------------------------------|-----------------------------------------------|-----------------------------------------|----------------|----------------|---------------------------|-------------|------------------------------------------------------------------------------------------------|
| NaI(Tl)                                                             | 38                        | 100                                      | -0.3                                                       | 250                 | 415                                             | 1.85                            | 2.5                                           | 47.4                                    | <100>          | 2              | 3.67                      | yes         | General purpose, good energy resolution                                                        |
| Polyscin®NaI(Tl)                                                    |                           |                                          |                                                            |                     |                                                 |                                 |                                               |                                         | none           |                |                           |             | Polycrystalline NaI(Tl), for extra strength                                                    |
| CsI(Tl)                                                             | 54                        | 45                                       | 0.01                                                       | 1000                | 550                                             | 1.79                            | 2                                             | 54                                      | none           | 2              | 4.51                      | slightly    | High Z, rugged, good match to photodiodes                                                      |
| CsI(Na)                                                             | 41                        | 85                                       | -0.05                                                      | 630                 | 420                                             | 1.84                            | 2                                             | 54                                      | none           | 2              | 4.51                      | yes         | High Z, rugged                                                                                 |
| CsI(pure)                                                           | 2                         | 4-6                                      | -0.3                                                       | 16                  | 315                                             | 1.95                            | 2                                             | 54                                      | none           | 2              | 4.51                      | slightly    | High Z, fast emission                                                                          |
| BGO                                                                 | 8 - 10                    | 20                                       | -1.2                                                       | 300                 | 480                                             | 2.15                            | 1                                             | 7                                       | none           | 5              | 7.13                      | no          | High Z, compact detector, low afterglow                                                        |
| BaF <sub>2</sub>                                                    | 1.8                       | 3                                        | 0                                                          | 0.6 - 0.8           | 220(195)                                        | 1.54                            | 1.9                                           | 18.4                                    | <111>          | 3              | 4.88                      | slightly    | Fast component (subnanosecond)                                                                 |
|                                                                     | 10                        | 16                                       | -1.1                                                       | 630                 | 310                                             | 1.50                            | 1.9                                           | 18.4                                    | <111>          | 3              | 4.88                      | slightly    | Slow component                                                                                 |
| CaF <sub>2</sub> (Eu)                                               | 19                        | 50                                       | -0.33                                                      | 940                 | 435                                             | 1.47                            | 2.9                                           | 19.5                                    | <111>          | 4              | 3.18                      | no          | Low Z, $\alpha$ & $\beta$ detection                                                            |
| CdWO <sub>4</sub>                                                   | 12 - 15                   | 30-50                                    | -0.1                                                       | 14000               | 475                                             | ~2.3                            | 1                                             | 10.2                                    | <010>          | 4 - 4.5        | 7.9                       | no          | High Z, low afterglow, for use with photodiodes                                                |
| BrilLanCe® 350 LaCl <sub>3</sub> (Ce)                               | 49                        | 70-90                                    | 0.7*                                                       | 28                  | 350                                             | ~1.9                            | 2.3                                           | 11                                      | <100>          |                | 3.85                      | yes         | General purpose, excellent energy resolution                                                   |
| BrilLanCe® 380 LaBr <sub>3</sub> (Ce)                               | 63                        | 165                                      | 0                                                          | 16                  | 380                                             | ~1.9                            | 1.8                                           | 8                                       | <100>          |                | 5.08                      | yes         | General purpose, best energy resolution, rate of change of light output w/temperature is small |
| PreLude® 420 Lu <sub>1.8</sub> Y <sub>2</sub> SiO <sub>5</sub> (Ce) | 32                        | 75                                       | -0.28                                                      | 41                  | 420                                             | 1.81                            | 1.1                                           | --                                      | none           |                | 7.1                       | no          | Bright, high Z, fast, dense, background from <sup>176</sup> Lu activity                        |
| ZnS(Ag)                                                             | ~50                       | 130                                      | -0.6                                                       | 110                 | 450                                             | 2.36                            | --                                            | --                                      | --             | --             | 4.09                      | no          | Multicrystal, 15 $\mu$ stops 5.5 MeV $\alpha$ (n detection with <sup>6</sup> Li)               |
| YAG(Ce), Y <sub>3</sub> Al <sub>5</sub> O <sub>12</sub> (Ce)        | 8                         | 15                                       | --                                                         | 70                  | 550                                             | 1.82                            | 2                                             | ~80                                     | none           | 8.5            | 4.55                      | no          | $\beta$ -ray, X-ray counting, electron microscopy                                              |

The data presented are believed to be correct but are not guaranteed to be so.

Please see individual data sheets for full details