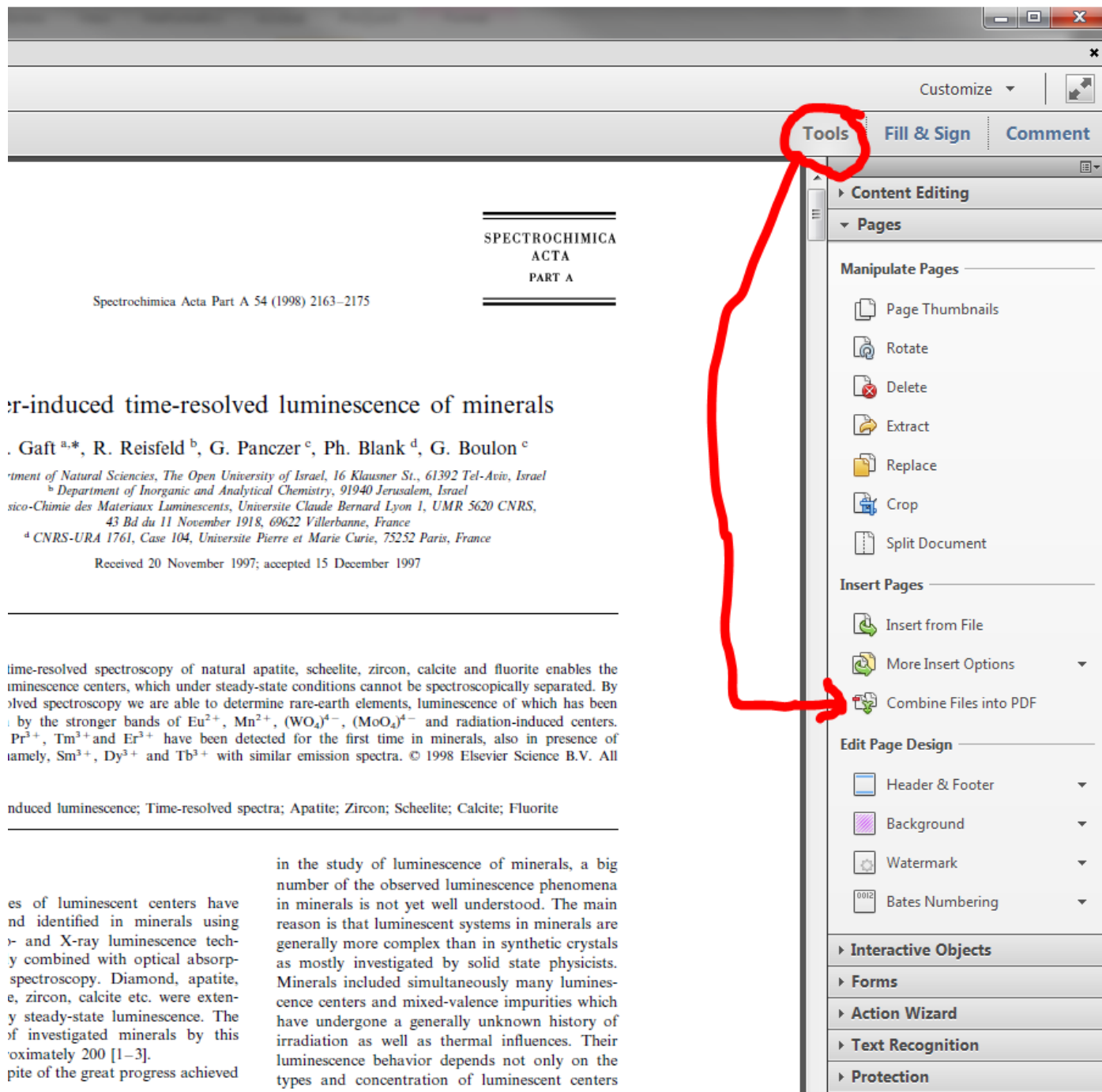


## NÄIN YHDISTÄT PDF-tiedostoja (Adobe Pro - yliopistolla)

Tools-välilehdeltä Combine Files into PDF



The screenshot displays the Adobe Acrobat Pro interface. The 'Tools' menu is highlighted with a red circle, and a red arrow points to the 'Combine Files into PDF' option in the 'Pages' section of the right-hand sidebar. The main document content is a page from 'SPECTROCHIMICA ACTA PART A', featuring the title 'Radium-induced time-resolved luminescence of minerals' and author information.

**SPECTROCHIMICA ACTA PART A**

Spectrochimica Acta Part A 54 (1998) 2163–2175

### Radium-induced time-resolved luminescence of minerals

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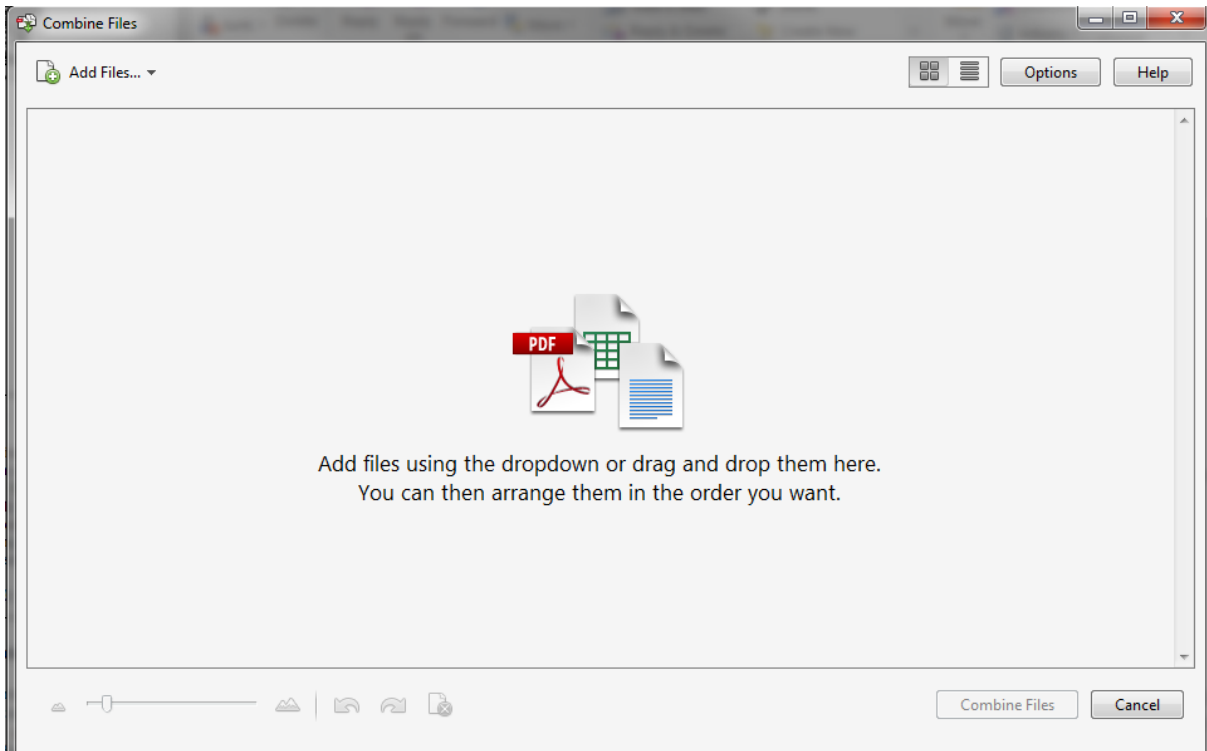
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Time-resolved spectroscopy of natural apatite, scheelite, zircon, calcite and fluorite enables the identification of luminescence centers, which under steady-state conditions cannot be spectroscopically separated. By pulsed spectroscopy we are able to determine rare-earth elements, luminescence of which has been obscured by the stronger bands of  $\text{Eu}^{2+}$ ,  $\text{Mn}^{2+}$ ,  $(\text{WO}_4)^{4-}$ ,  $(\text{MoO}_4)^{4-}$  and radiation-induced centers.  $\text{Pr}^{3+}$ ,  $\text{Tm}^{3+}$  and  $\text{Er}^{3+}$  have been detected for the first time in minerals, also in presence of  $\text{Ca}^{2+}$ ,  $\text{Sm}^{3+}$ ,  $\text{Dy}^{3+}$  and  $\text{Tb}^{3+}$  with similar emission spectra. © 1998 Elsevier Science B.V. All rights reserved.

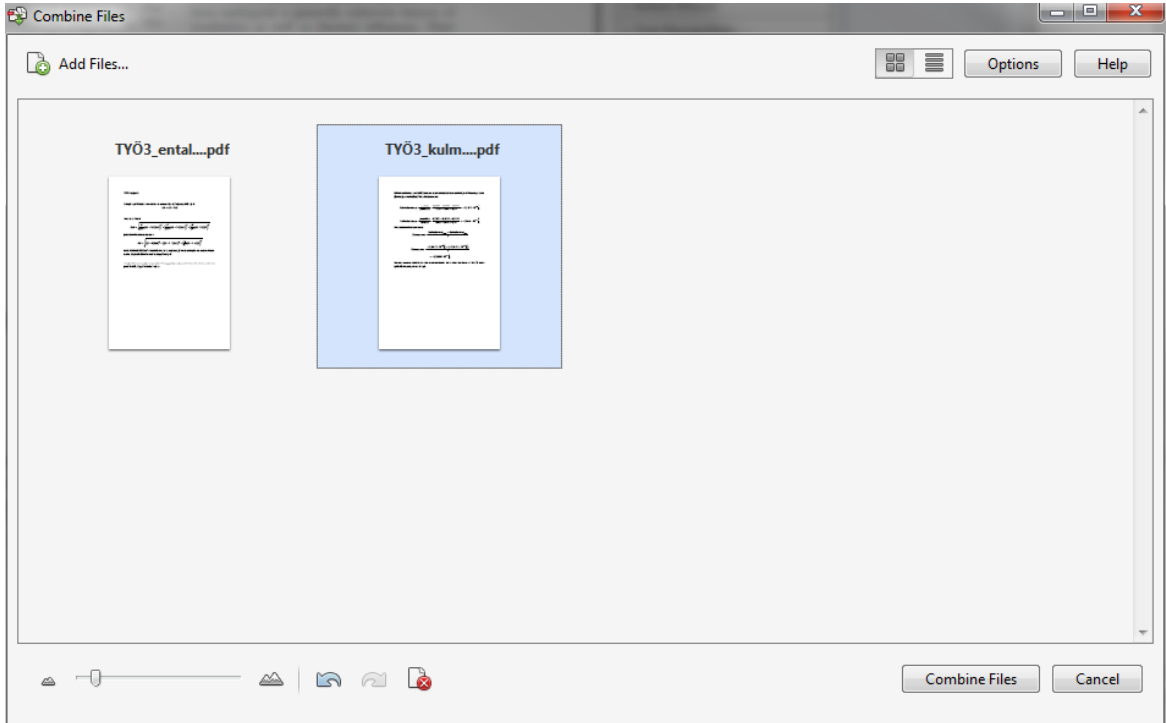
**Keywords:** Radium-induced luminescence; Time-resolved spectra; Apatite; Zircon; Scheelite; Calcite; Fluorite

... in the study of luminescence of minerals, a big number of the observed luminescence phenomena in minerals is not yet well understood. The main reason is that luminescent systems in minerals are generally more complex than in synthetic crystals as mostly investigated by solid state physicists. Minerals included simultaneously many luminescence centers and mixed-valence impurities which have undergone a generally unknown history of irradiation as well as thermal influences. Their luminescence behavior depends not only on the types and concentration of luminescence centers, but also on the energy transfer within the

Avautuvaan ikkunaan haetaan halutut tiedostot joko Add Files –napista yläreunasta tai raahataan hiirellä hakemistosta keskelle ikkunaan.



Kun tiedostoja on tarvittava määrä, paina Combine Files –nappia alareunasta.



Tallenna uusi yhteistiedosto File-valikosta -> Save as..

Huomaa, että Tools->Pages –valikossa voi kääntää sivuja (Rotate) tai poistaa (Delete)jonkun tarpeettoman – testaa ja kokeile tarpeen mukaan!