**Supplementary data**

**esm 1**

Tourmalinites

The tourmalinites appear as interlayered lenses of 30 to 50 cm thickness in the fine grained biotite-muscovite schist/gneiss of the CMC (samples 14, L28, TDA). The tourmalinite layers are discontinuous but along strike total lengths of about 50 m were measured.

**Sample 14** is a banded fine grained tourmalinite with more than 65% of modal tourmaline that is made up by alternating lensoid bands of nematoblastic melanocratic aspect and granoblastic leucocratic aspect. A lineation is defined by the parallel orientation of the major axis of prismatic tourmaline. The melanocratic bands are composed of tourmaline (85%), plagioclase, subhedral epidote-clinozoisite, titanite, quartz, scarce tiny muscovite flakes and opaque minerals which are located mostly inside titanite and appear as elongated blades (rutile?). Tourmaline crystals are subhedral to euhedral and poikiloblastic. Subhedral to anhedral crystals of sericitized plagioclase and anhedral quartz form aggregates. The leucocratic bands are mainly composed of a quartz mosaic (90%) with subhedral crystals of sericitized sodic plagioclase, scarce flakes of muscovite and chloritized biotite, and sporadic tourmaline crystals.

**Sample L28** is banded fine grained massive tourmalinite. It is composed of tourmaline (60%), muscovite (20%), plagioclase (10%), quartz (5%), apatite and opaque minerals (5%). Banding is defined by the alternation of lensoid melanocratic and leucocratic layers. Two types of leucocratic layers occur, one made up by to 2 mm muscovite plates and another composed mainly of a granoblastic aggregate of up to 0.1 mm plagioclase and quartz. Melanocratic layers consist of poikiloblastic, euhedral to subhedral tourmaline crystals up to 2 mm long in a groundmass of sericitized plagioclase and anhedral quartz. Up to 2 mm long, rectangular, opaque minerals (rutile?) are associated with tourmaline. Grain boundary migration in quartz as well as deformation twins in plagioclase, bending and wavy extinction in muscovite suggest a deformation overprint.

**Sample TDA** is a fine grained tourmalinite composed of tourmaline (55%), quartz (25%), muscovite (10%), apatite (8%), rutile and zircon (2%). Penetrative foliation is defined by the orientation of poikiloblastic tourmaline and muscovite. Locally, granoblastic leucocratic and lepidoblastic/ nematoblastic melanocratic bands are observed. The latter are made up by tourmaline, muscovite and quartz. Tourmaline sizes are approximately 3 mm maximum. Quartz is anhedral with sizes from 0.01 to 0.8 mm. Where the leucocratic bands occur we observed grain boundary migration and recrystallization of quartz. Muscovite varies from 0.1 to 0.6 mm in size. The bigger crystals are associated with tourmaline and quartz and the smaller ones are included in tourmaline. Apatite up to 0.5 mm is associated with tourmaline while rutile and zircon are inclusions in tourmaline.

Tourmaline Schists

**Sample 17** was collected from a concordant 1m-thick layer in banded schists. It is a fine-grained, grey biotite-muscovite quartz schist, which exhibits a weakly-folded penetrative foliation. Discordant 1mm thick quartz and feldspar veins cut across the main foliation. The sample is composed of quartz (30%), biotite (25%), muscovite (20%), tourmaline (15%), plagioclase (5%) and accessory zircon, apatite and opaque minerals (5%). Quartz has a granoblastic texture while dark brown, subhedral biotite and muscovite develop the foliation. Some biotite crystals exhibit kink bands. Thin muscovite plates are oriented oblique to the main foliation. Tourmaline crystals, some of them poikiloblastic, are euhedral and homogeneously distributed, most of them are associated to mica plates. Plagioclase crystals are subhedral and slightly altered to sericite and clay minerals.

**Sample 19** is a fine-grained muscovite-biotite quartz-schist with tourmaline. The texture comprises a granoblastic quartz matrix and a penetrative foliation defined by muscovite and biotite with locally parallel tourmaline prisms. The rock is composed of quartz (35%), tourmaline (25%), biotite (15%), muscovite (12%), chlorite (8%), K-feldspar (3%) and rutile, apatite and opaque minerals as accessories. Quartz is anhedral and exhibits grain boundary migration in some crystals. Tourmaline crystals are euhedral with a maximum length of 0.5 mm. Biotite plates are light to dark brown and some crystals are slightly chloritized. Muscovite plates are associated with biotite. Some chlorite crystals appear as aggregates associated with tourmaline. Scarce K-feldspar crystals are altered to muscovite.

Granites

Samples **GLA** and **GLA2** belong to Los Alanices Granite. The rocks are medium grained inequigranular light pink to light grey leucomonzogranites that consist of pink to white microcline (40%), plagioclase-An8 (30%), quartz (15%), light green muscovite and biotite (together 10%) and apatite, tourmaline and garnet (5%) as accessory minerals. Microcline, plagioclase and quartz are about 2 mm in maximum size. Microcline crystals are anhedral and exhibit crosshatched twinning. Plagioclase is subhedral and contains quartz inclusions. Quartz is anhedral and shows evidence of grain-boundary migrations as recrystallized 0.05 mm aggregates of polygonal crystals around the margins of bigger grains. Subhedral plates of muscovite, with maximum size up to 1.75 mm, wrap around feldspar crystals. Fine grained muscovite-sericite occurs as an alteration of plagioclase. Scarce biotite flakes up to 0.7 mm across are interlayered with muscovite. Apatite forms prismatic crystals. Garnet is subhedral and homogenously distributed. Tourmaline occurs as subhedral up to 1 mm brown prisms. Some crystals are fractured and others are symplectitic with quartz.

**Sample DA** represents the Don Andino Granite. The rock is a medium grained, inequigranular, white leucomonzogranite composed of plagioclase (40%), quartz (20%), muscovite (20%), K-feldspar (10%), with minor tourmaline, garnet and apatite (together 10%). Plagioclase up to 2.5 mm size, is subhedral and partly altered to clay minerals and sericite. Albite twinning is preserved but deformation twins are also present. Quartz appears as anhedral crystals with variablly developed subgrains and grain boundary migration at the borders. Recrystallized polygonal quartz aggregates also occur. K-feldspar up to 2 mm in size has alteration to clay minerals in some sectors. Muscovite plates up to 2mm are slightly bent. Tourmaline is euhedral to subhedral, commonly fractured and associated with quartz, muscovite and plagioclase. Garnet is fractured and has maximum sizes up to 2 mm. The maximum size of apatite is 0.6 mm.

**Sample MH** belongs to an aplitic-pegmatitic dike. The rock is medium grained, inequigranular and white to light grey in color consisting of plagioclase-An10 (35%), microcline (25%), quartz (15%), tourmaline (20%) and muscovite (5%). The plagioclase is subhedral with maximum size of about 2 mm, slightly altered to clay minerals and locally showing myrmekite development at borders. Microcline crystals reach 1.5 mm in size and some crystals with sizes less than 1 mm form inclusions in tourmaline. Anhedral quartz crystals up to 1mm in size exhibit subgrain development, in some cases with grain boundary migration when they are in contact with tourmaline. Fractured, poikilitic tourmaline crystals reach nearly 5 mm in lenght. Muscovite plates approximately are 0.3 mm, across occur mostly at grain boundaries of tourmaline or between albite and quartz.